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RATING AND VALUATION

IN a paper on the new Local Government Act which he presented to the Annual Conference of the Incorporated Association of Rating and Valuation Officers, at the Central Hall, Westminster, on June 25, Mr. J. D. Trustram Eve (a Past-President of the Rating Surveyors' Association) drew attention to the effect of the Act on a series of common law principles which has established that for rating purposes, the question of whether or not a dwelling-house forming part of a public utility undertaking, constitutes a separate hereditament depends on whether it is one capable of being separately let. The speaker was inclined to take the view that under Part IV of the Act this test might no longer be applicable, and that such property would be assessed at 5% on its cost—notwithstanding that the *cumulo* valuation of the undertaking of which it forms part has a *nil* valuation arrived at on the revenue basis.

Where a gas-works manager is resident on the works and has no option but to occupy the accommodation afforded him for the performance of his duties, it has been usual not to assess the house separately from the gas undertaking and to regard it as being included in the *cumulo* valuation. The 1948 Act was designed to bring about many changes in the existing law of rating and valuation, which may or may not prove advantageous to the community as a whole, but the indirect effect of some of its provisions has yet to be known. We hope that some official guidance will be given as to the correct interpretation of this new departure.

SHEFFIELD'S GAS GRIDS

THE Presidential Address of Mr. W. T. Hird to the Yorkshire Junior Gas Association was a highly interesting account of the two grids under the control of the Sheffield and District Gas Company—the one a crude gas collecting grid, the other a purified gas distributing grid. At present about 38 mil. cu.ft. of gas is collected daily by the crude gas grid, and, out of this total, 3 mil. cu.ft. per day is sold in bulk by adjoining gas undertakings. At present 13,000 mil. cu.ft. per annum of coke oven gas is supplied to the grid by 12 coking plants, and this gas is purified at three manufacturing and purification stations and one storage and purification station. Between 1931 and 1942 the amount of gas distributed and sold for industrial purposes increased from 2,367 mil. cu.ft. to 12,096 mil. cu.ft. per annum. The crude gas grid operation is based on volume, the coking plants operating their compressors at pressures suitable to supply into the grid the volume of gas agreed—normally the full available output of each plant. At maximum input the highest pressure necessary is of the order of 20 lb./sq.in. The grid is controlled from a central control room in Sheffield, and it has been decided to control all holder stations supplied by the purified gas grid from the central control room in Sheffield. For any grid to be economic in operation, commented Mr. Hird, a very high load factor must be maintained. For this reason it has in the past been suggested that only supplies which can be governed volumetrically should be given from a grid. This is undoubtedly sound in theory, but any grid which in linking up a group of small undertakings passes through rural districts is bound to pass small isolated villages and even individual houses and farms which can have no possible supply of gas unless it be from the passing grid mains. These supplies, moreover, cannot be controlled volumetrically. However, as long as the uncontrolled supplies are only, as they normally will be, a small part of the total grid load, and given a well-designed system of remote volumetric control of the holder stations supplied, there is no reason why the otherwise isolated villages and farms should not be connected to the grid without materially reducing the grid load factor.

Mr. Hird's valuable address is pubished in full in the July issue of "GAS."

COMFORT IN THE HOME

THE fuel problem in post-war dwellings was the subject of a paper by Mr. H. P. Lupton, of the Liverpool Gas Company, at a joint meeting of the Manchester District Junior Association of Gas Engineers and the North-Western District Gas Salesmen's Circle. The paper is published in the July issue of "GAS." There has, he remarked, been a tremendous amount of talk concerning the complete change in heating service which district heating would bring about. It was said that such a service would give the householder warmth throughout the house, and as much hot water as he required at a cost less than pre-war. Smoke would be abolished, and cartage and storage of solid fuel would cease. It seemed often to be forgotten that such a service would not light the house nor cook the meals, nor wash the clothes, nor burn the refuse. The fact that one householder's requirements were different from another's as regards both the temperature he liked or the amount of hot water he used was ignored, as was also the variation in his income, the charge for the service being included in the rent. The district heating experts differed widely as to the probable cots of such a service, estimates varying between 4s. 6d. per week and 13s. for the same sized house. Many schemes that had been discussed allowed for one solid fuel fire and for a gas or electric cooker, for a gas or electric fire in one bedroom, and for a wash boiler or machine as extras. The cost of running these extras was not included in the weekly figure, and was, in fact, frequently ignored. Mr. Lupton concluded: "Whether the gas industry is a one or two fuel industry, it has a great opportunity to increase the comfort and amenities in post-war homes. The best way in which our fuel resources can be used is one of the most important problems of the present time, and it is the duty of every salesman and every gas engineer to know as much as possible about the sources of our fuel, about the way in which the fuel can be utilized, and about the appliances used for converting the fuel into the various heating tasks it has to perform. The gas industry can still utilize our coal resources more economically than can its competitors, and can still more than hold its own against all comers. . . Do not let nationalization damp your ardour."

THE FUTURE BECKTON

The Governor of the Gas Light and Coke Company and some of his colleagues extended what may well prove to be their last corporate welcome as the chiefs of the 136-years-old Company to a party of visitors last week, when their own renowned Distribution Engineer, Mr. H. J. Escreet, as President of the Southern Association of Gas Engineers and Managers, presented to them some 150 of his fellow-members—many of them, like himself, proud to serve the Company which was entertaining them—together with a goodly number of ladies, on a visit especially arranged to enable them to see the new battery of coke ovens which came into use on Friday and the early stages of erection of the further battery on the adjoining site. Except that it is still a Company, as distinct from a municipally or nationally owned institution, we imagine that the Gas Light and Coke Company of to-day bears little resemblance to the Company for whom Adams Beck and his co-workers developed Beckton 80 years ago as a model of rural gas-works supplying gas to what was then a distant city. Since the end of the war a substantial start has been made on the long-term programme of extensions and reconstruction, and the cost of the constructional work actually in hand at Beckton at present cannot be far short of a million pounds. An old chapter closes and a new one opens. The future Beckton will be very different from anything its founders conceived. An Area Board will, on vesting date, supersede the present Court of Directors, but we believe that Beckton will for ever remain a monument of administrative and technical efficiency in the art of gas making. It may be that at some future date the Southern District of the Institution of Gas Engineers will be graciously invited to visit the Beckton Station of the North Thames Area Gas Board. Whatever the new set-up may be, it cannot be doubted that the spirit of service which has made the industry what it is to-day will still prevail, and that the nationalized industry will continue to be served by very much the same personnel that has brought it to its present high state of efficiency.

TOWARDS INCREASED EFFICIENCY

Whatever criticisms may have been made in the past concerning the efficiency of domestic heating appliances and house heating in this country, the sternest critics cannot but admit that our efforts to redeem past shortcomings and achieve increased efficiencies are perhaps the most ambitious in the world. The scope for improvement was outlined in the Egerton and Simon reports, and neither the appliance manufacturers nor the housing authorities were slow in accepting the challenge. The governor and compass of the latter's machinery for securing increased efficiency, which offered guidance and equilibrium in a task endangered by misdirection and lack of proportion, have been Watson House and other bodies concerned with a rigid combination of accurate testing and constructive criticism. A comparatively new entrant to the field of appliance testing, the Fuel Research Station was, until the latter part of the war, concerned with investigating the properties and utilization of domestic fuels. With commendable initiative and thoroughness, the facilities for testing have been extended and elaborated, culminating in the provision of a calorimeter building on a scale probably unequalled in Europe, or, for that matter, in the world. The new building, which is described elsewhere in this issue, makes possible the accurate assessment of the total useful heat obtainable from any domestic appliance, whether solid fuel, gas, or electric, operating under natural conditions, variable at will. As such it is a progressive step which makes possible a new conception of appliance research, the results of which must be both significant and far-reaching.

BURDEN OF ADMINISTRATION

An appeal to the Prime Minister for a reduction in the burden of public administration, in which one-ninth of the whole working population is now engaged, is being made by the National Union of Manufacturers, representing over 4,000 individual firms and 50 trade associations. The National Union states that the country can no longer support this heavy burden of cost or be deprived of the manpower thus occupied and demands that public administration shall be reduced to the conditions of austerity in which industry itself is compelled by present circumstances to operate. The memorandum reminds the Prime Minister that a year ago he declared that the Government "fully accept the desirability of reducing the Civil Service numbers and, as one means of achieving this result, are continuing their scrutiny of administrative methods." These measures, "and the relaxations of rationing and controls, are expected to produce a large reduction in the Civil Service" . . . and while "it is not possible to predict how long it will take to realise these savings in full, the Government intend to press forward to this objective with all possible speed." The National Union has been watching the position during the past 12 months and hoping to see the developments foreshadowed but no such results are yet at all apparent; on the contrary, the Civil Service continues to absorb an unduly high share of the national income and national manpower. On July 1, 1947, the total number of the Government staffs was, according to the Monthly Digest of Statistics, 711,600. On April 1, 1948, the latest date shown in the Monthly Digest, the number was 704,900. There is no suggestion of any criticism of the individual permanent Civil Servant whose integrity and industry deserve the highest praise and who—especially in the higher ranks—is often working under conditions of great strain and pressure. But this large army of Civil Servants, apart from its inflationary effect, constitutes for industry a serious burden of a three-fold character: first, the cost which must be borne by industry; second, the loss to industry of valuable manpower often of the best administrative type; and lastly, the work imposed on industrial staffs by the multifarious demands for information, returns, &c., by the Government Departments.

PAINT FOR HOUSE REPAIRS

Urgently needed work on property repair and redecoration will be assured of ample supplies of paint by the Paint Manufacturers and Allied Trades Association through its 350 firms. In future, the Board of Trade, by arrangement with the industry, will no longer specify the proportions in which the manufacturer is to use controlled materials for the three main types of paint—building, transport, and industrial. It will therefore be possible for the industry to follow closely the current demand for each type. Member firms of the Association, while meeting the need for industrial finishes (particularly for exports) and for transport, will maintain output of building paint to the maximum for which labour to apply it will be available in order to protect property before the winter months and for interior redecoration during the bad weather period. The new arrangement conveniently coincides with the increase to £100 in the amount which may now be spent on building repairs without licence.

BENZOLE AND PETROLEUM CONTROL

The Minister of Fuel and Power has made the Benzole and Allied Products (Control) Order, 1948 (S.I., 1948, No. 1419), and the Control of Petroleum (Amendment) Order, 1948 (S.I., 1948, No. 1420), both of which came into operation on July 1, when the Petroleum Board ceased to exist. The Benzole and Allied Products (Control) Order, 1948, revokes the Control of Benzole and Allied Products Order, 1945, and re-enacts its provisions with amendments necessary because of the dissolution of the Board, and certain other amendments. Prices for benzoles other than crude and motor benzoles are maximum instead of fixed prices. There are no price provisions for crude and motor benzoles. Dealings in refined benzoles are controlled by licence to supply instead of licence to acquire (in the case of motor benzole, by supply licences to producers and refiners). Provisions fixing the charges for the hire of drums and barrels are omitted. Where a price fixed under the Order is "ex-works" and a contract is made at a price including delivery, the latter may include only the expenses actually and necessarily incurred by the seller in making delivery. The Control of Petroleum (Amendment) Order, 1948, makes amendments to the Control of Petroleum Order, 1944, necessary on the dissolution of the Petroleum Board and certain amendments to clarify the provisions of the original Order. The restrictions on disposal of petroleum (which includes aviation spirit, motor spirit, kerosene, gas, diesel, and fuel oils, lubricating oils, white oils, and other petroleum products) remain unchanged for suppliers, but buyers will no longer be required to see that their supplier holds a licence.

SALARY GRADING—LONDON REGION

The London Regional Joint Council for Gas Staffs, which, in January, 1948, adopted a salary grading scheme for male clerical employees, has now reached agreement on salary scales covering all female staffs (other than technical) employed by the London gas undertakings.

These new scales will have effect from Jan. 1, 1948, the date of introduction of the new scales for male clerical employees.

Negotiations are continuing in respect of professional and technical grades.

Personal

Mr. F. B. OLIVER, Assistant Engineer to the Hawick Gas Company, has now been appointed Deputy Engineer and Manager of the Johnstone Gas Department.

* * *

Mr. R. WADDELL, who retired owing to ill-health from the position of Engineer and Manager of the Polmont District Gas Company some little time ago, was recently presented with a wireless set by his colleagues in the area.

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Mr. HARRY SHERBURN, who has been with Richmonds Gas Stove Company, Ltd. (Radiation, Ltd.), for 47 years, as Foundry Manager, Works Manager, and in charge of development and technical control of the Warrington Group of Radiation Companies, has been elected to the Board of Richmonds.

* * *

Mr. JOHN PICKUP SMITH, M.Inst.Gas E., has been appointed to the Board of Meters, Ltd. Mr. Smith has been with the Company since 1931, first in the capacity of Sales Representative for George Orme & Co., and latterly as General Manager of Sawer & Purves, Miles Platting, Manchester, and branches.

* * *

Mr.A. F. AMES, Gas Engineer and Manager to the Burnley Corporation since August, 1934, is to retire on superannuation on Sept. 30. Before going to Burnley he was Gas Engineer at Darwen for three years. He had charge of Padiham's gas undertaking from 1918 to 1924, and that at Oswaldtwistle from 1924 to 1931.

* * *

On June 30 Mr. B. GODDARD retired from his position as Engineer and Manager to the Glossop Gas Company after 50 years' service, 40 of them in his present office. He was succeeded by Mr. M. HAMSHAW, B.Sc., formerly the Assistant Engineer and Manager. After a similar length of service the Secretary, Mr. W. TOWNEND, also retired, his successor being Mr. R. T. DYSON.

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Mr. A. B. BALMFORD, B.A., Managing Director of the National Gas and Oil Engine Co., Ltd., of Ashton-under-Lyne, has terminated an association which commenced with the Company 44 years ago, and Mr. A. E. CARRODUS, formerly Manager of the estimating department, has been appointed to succeed him. Made a Director in 1920, Mr. Balmford became Joint Managing Director in 1929 and Managing Director in 1945. Joining the Company from Sulzer Bros., Switzerland, Mr. Carrodus became the first Manager of the new marine department in 1933, and in 1938 was appointed Manager of the estimating department, Mr. JOSEPH JONES, who has been promoted to a directorship, started with the firm as an apprentice fitter in 1908 and during the 1914-18 war was appointed chief tester and service engineer in the large engine department, of which department he later became Manager. In 1940 he was appointed Chief Engineer He has been responsible for the new designs of vertical engines introduced by the Company.

Obituary

Mr. ROBERT AITKEN, who died at his home at Montrose, a week after his retirement from business, was a Director of the Montrose Gas Company.

Diary

July 12.—**Women's Gas Council**: Executive Committee, Gas Industry House, 1 p.m.

July 13.—**Federation of Gas Employers**: Central Committee, Gas Industry House, 11.30 a.m.

July 13.—**British Gas Council**: Central Board, Gas Industry House, 2.30 p.m.

July 13.—**National Federation of Gas Coke Associations**: General Committee, Gas Industry House, 10 a.m.

July 14.—**Technical Sub-Committee (Domestic Development Committee)**: 10.30 a.m., Gas Industry House.

July 14.—**Domestic Development Committee**: 2 p.m., Gas Industry House.

July 15.—**Solid Smokeless Fuels Federation**: Executive Committee, Dorchester Hotel, Park Lane, 11.30 a.m.

July 21.—**British Standards Institution**: Annual General Meeting, Institution of Electrical Engineers, Savoy Place, London W.C.2, 3 p.m.

Since Street Lighting was resumed at Rowley Regis, after the war, the Cradley Heath Gas Company have had to replace 5,000 panes of glass because of malicious damage.

Letter to the Editor

Conduct of Institution Meetings

DEAR SIR,—May I, as a member of the Institution of Gas Engineers, have the courtesy of your columns to make a plea to the President of the Institution to re-introduce the system tried out some years ago, whereby contributors to the discussions of papers presented at the Annual and Autumn Research Meetings were set a specified time limit for their remarks. At the recent meeting there were many examples of contributions of inordinate length; in fact it seemed that it was the exception rather than the rule for individual contributions to be shorter than the actual presentation of the paper by its author.

The admirable system whereby a paper is taken as read and is given a short presentation summarizing, supplementing or emphasizing its features, is now universally practised by this and other technical and scientific bodies. Perhaps this system could be extended to the discussion of the papers. If a contributor felt impelled to "wade" through the paper, commenting at length on each page or paragraph, this could be submitted as his written contribution which would then be summarized or abridged at the discretion of the President or the Secretary of the Institution, and by the Editors of the Technical Press. The contributor would then be expected to make a verbal commentary, limited to say five or 10 minutes, and furthermore should be encouraged to extemporize it if he felt able, knowing that it would be his written and not his spoken words which would be recorded. If such a scheme were practised we should be spared those seemingly never-ending contributions read out from pages of typewritten sheets, and more people could join in the discussions from which they are now debarred by shortage of time. The discussions would also be more lively and less stereotyped.

It is discouraging to the younger members of the Institution who are often vainly awaiting their turn to speak, to see the time running out and the President exhorting senior members to curtail their remarks, knowing that this will result in their reading precisely what they had already written, but speaking rather more hurriedly, and as a result, often less audibly.

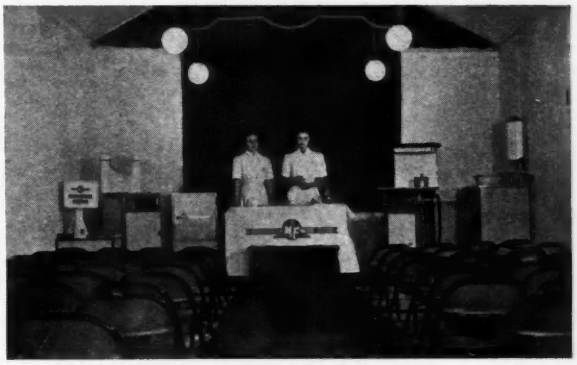
I feel sure a large number of my fellow-members will agree that they find the reading of long and detailed comments makes boring listening, by which the occasional extemporized contribution stands out in brilliant contrast. I also feel it should be a fairly elementary exercise, quite within the capabilities of all members, to make a contribution lasting any desired length of time.

In view of the fact that my remarks will inevitably be taken as personal criticism of some quite senior members of the Institution —as indeed they are—may I ask you not to publish my name and to allow me to employ the pseudonym—

CONSTRUCTIVE CRITIC.

July 3, 1948.

A Window Display by the Alliance and Dublin Consumers' Gas Company, in its Rathmines, Dublin, showrooms, has been withdrawn on account of a protest made on behalf of African students in Dublin. The display depicted a European being boiled in a cauldron over a wood fire somewhere in the "Dark Continent." Nearby were two natives carrying a gas cooker with a showcard reading: "It's quicker with gas." The protest was made by a Nigerian student at Trinity College, Dublin, in the name of the African community in Dublin, on the ground that the display was not a true reflection of the state of culture in Nigeria at the present time. The Gas Company had no specific African territory in mind when the display was designed.



The Pembroke District Gas Company has recently opened a demonstration theatre capable of seating 120. *Gas industry films were shown throughout the first week; in the second week cookery demonstrations were given under the auspices of the Ministry of Food.*

SOUTHERN ASSOCIATION'S SUMMER MEETING AT BECKTON

BY invitation of the Governor and Directors of the Gas Light and Coke Company, the Summer Meeting of the Southern Association of Gas Engineers and Managers was held on June 29 and consisted of a visit to Beckton, primarily for the purposes of inspecting the coke oven plants already in operation and in course of erection. The majority of the members and their ladies—and there was a very good attendance of ladies despite the tactful warning in the invitation that there was nothing in the programme with an exclusively feminine appeal—assembled at Gas Industry House and made the journey to and from Beckton by motor coaches. On arrival at the works they were entertained to luncheon, at which Mr. Michael Milne-Watson, the Governor, presided, supported by Mr. W. K. Hutchison, Managing Director, Mr. N. Willsmer, Chief Engineer, Dr. J. Burns, Deputy Chief Engineer, Mr. H. J. Escreet, Distribution Engineer and President of the Southern Association, and a number of other chief officials, together with Colonel Harold C. Smith, Deputy-Chairman Designate of the new Gas Council, and Mr. C. H. Chester, Senior Vice-President of the Institution of Gas Engineers.

The proceedings were delightfully informal, and in place of the usual toasts there were brief speeches of welcome by the Governor and acknowledgments by Mr. L. P. Ingram, President-Elect, and Mr. Escreet, the President.

Mr. Milne-Watson expressed regret at the absence, through slight indispostion, of Mr. F. M. Birks, Deputy-Governor, and, owing to her visit to the United States, of Mrs. Milne-Watson. As many of the visitors had been to Beckton before he would not bore them with figures, but he drew attention to the fact that when Beckton was planned 80 years ago it was a great adventure, based on the idea of taking the gas-works right out of the town. Since those days London had grown and had come almost to the doors of the works, but that was due to no fault on the part of the founders, who conceived the idea of the model rural gas-works. Eighty years ago the manufacture of gas was much more developed and further ahead technically than the distribution of gas, but the founders did a very brave thing in laying two 48 in. gas mains from Beckton to the City and from there to Westminster, a total distance of nine miles.

Even to-day a 48 in. main was not a bad size, and in those days it was a triumph to lay such a main for such a distance, owing to the material used and the shape of the pipes, some of which would not fit together. Times had changed, and distribution no longer lagged behind manufacture of gas. This year the Southern Association had as its President, Mr. Escreet, the Company's Distribution Engineer. He was a most retiring, modest man, but wherever throughout this country, and in other countries throughout the world, distribution matters were discussed, Mr. Escreet's name was bound to enter into

The Governor of the Gas Light and Coke Company, Mr. Michael Milne-Watson, received the guests on their arrival at Beckton. Left to right: Mr. S. Hay, G.M., Group Engineer; Mr. G. Dougill; Mr. Michael Milne-Watson; Mr. H. Bradley, Station Engineer at Beckton.

In the producer house, whence Nos. 1 and 2 batteries of coke ovens derive their supplies of producer gas. A similar producer plant is now under construction for supplying Nos. 3 and 4 batteries.

Two parties of visitors outside the producer house.

the conversation sooner or later because, in spite of his pretending that he knew nothing about the subject, he was a very great expert.

Lastly he wished the visitors a happy and interesting afternoon, assuring them that they would see some at least of the interesting projects that they were planning for the Beckton of the future.

Mr. L. P. Ingram (Taunton), President-Elect of the Southern Association, expressed thanks to Mr. Milne-Watson and his colleagues of the Gas Light and Coke Company for their warm reception and hospitality. The members of the Association felt highly honoured in having the Company's distinguished Distribution Engineer as President. To everyone in the gas industry the Gas Light and Coke Company had always been a monument of administrative and technical efficiency in the practice of the art of gas manufacture and distribution, and they were proud to have one of the shining lights of the Company as their President.

The late Sir David Milne-Watson, with his knowledge and foresight, probably envisaged some greater integration of the industry than the geographical organization which he built up in the Company and in the South Eastern Gas Corporation over which he also presided, and in the major national organizations of the industry, but he doubted whether in his wildest imagination he ever foresaw the extermination of the existing structure and its substitution by a nationalized gas industry. The Gas Light and Coke Company as a corporate body might be nearly dead, but it would not lie down, and he felt sure that its great spirit of service and its great tradition would live for ever in its offspring. Everyone in the industry owed a debt of gratitude to the Gas Light and Coke Company which, he felt, could be repaid only by continued devotion to the industry and to the public it served under the new regime.

Members of the Southern Association owed an even greater debt of gratitude to the Company for the steady outflow of technical papers from the Company's experts, from whom they had derived great inspiration and example.

Mr. **H. J. Escreet** briefly thanked all the visitors for coming to Beckton, and the Governor and Directors for allowing him to entertain them. He also thanked Mr. Bradley, Engineer at Beckton, and his staff, for all the arrangements made for their comfort and interest, and Mrs. Crouch, the Company's Catering Superintendent, and her staff, for the arrangements for the luncheon and tea.

Heavy rain during the luncheon had ceased by the time the speeches were over, and the tour of the works was completed in comfort, transport from point to point being provided by motor coaches. As we have already said, chief interest was centred in the coke ovens, a description of which was given in the Institution Number of the "JOURNAL" on June 16. The coke oven installation consists of two batteries constructed in 1930, a third battery completed this year, and a fourth battery at present in course of construction. No. 1 battery has been at work for 16 years, and has carbonized over three million tons of coal; No. 2 battery is now due for reconstruction; and No. 3 battery is newly completed and is just going to work. Construction of No. 4 battery has been started and affords an opportunity of seeing the internal structure of heating flues and ovens.

The existing producer plant was constructed in 1930 and has served to feed the first two batteries for a period of 16 years. An extension of the producer house is in process of construction, and this will eventually supply gas for the third and fourth batteries. The ancillary plant for Nos. 1 and 2 batteries is due for repair and partial reconstruction, while the ancillary plant for No. 3 battery affords a demonstration of some of the advances which have been made in the design of ancillary plants since the erection of the first batteries. The ancillary plant for No. 4 battery is at an early stage in its construction.

At the close of the tour the parties re-assembled for tea.

Mr. **J. H. Dyde,** Junior Vice-President, briefly returned thanks for this further hospitality and for the tour of inspection. He referred to the Beckton coke ovens as a supreme achievement of the gas industry in this or any other country, calling for the use of superlatives, and contrasted the charges of 10 cwt. in the original retorts with the 17 to 18 tons in the modern coke oven.

Mr. **Escreet** said he would have pleasure in conveying the visitors' expressions of thanks to all concerned in making the visit so enjoyable.

A CALORIMETER BUILDING FOR DOMESTIC HEATING RESEARCH

WHEN, towards the end of the war, the Fuel Research Station of the Department of Scientific and Industrial Research extended its research into the properties and utilization of domestic fuels to include the appliances consuming those fuels, with a view to bringing their standards of efficiency up to the approved level, it was at once realized that the routine testing facilities already available must be elaborated. A well-equipped installation was required, capable of testing appliances under a wide range of natural conditions. The task of designing an installation of the type required was undertaken by Dr. A. Blackie, then Chief Physicist at the Station; upon his retirement the work was completed by his successor and former assistant, Mr. R. H. Rowse. The result of their efforts was the Calorimeter Building, a four-storey structure occupying a ground area of about 3,000 sq. ft., which has just been put into operation.

A view of the control room, showing the equipment for two of the cabinets.

The main feature of the building is the provision of calorimeter cabinets of the same size as living rooms in small houses, so designed that when domestic appliances are installed and operated in them, the heat passing through the walls, floor, and ceiling is automatically recorded, thus determining by direct measurement the total useful heat. It is also possible to measure separately radiant heat, warmed air from convection jackets, and heat to the water boiler.

There are four calorimeter cabinets in the building, each 12 ft. square and 9 ft. high. Each cabinet is mounted centrally in a constant-temperature chamber, 20 ft. square and 26 ft. 6 in. high. These chambers occupy the four corners of the building extending from the ground floor to the underside of the smoke-testing floor and give easy access to the whole of the outside of the cabinets. The cabinets are entered from the central control room on the first floor.

A general impression of one of the smoke-testing rooms.

The smoke-testing rooms are on the third floor, above the constant-temperature chambers. The chimneys from the cabinets pass through these rooms, which are equipped for smoke measurement. Also on the same floor are a laboratory and the refrigeration plant which is used in connexion with two of the constant-temperature chambers.

The Calorimeter Cabinets

The cabinets are constructed of ¼-in. plywood panels, covered on both sides with copper sheeting divided into separate sections each 2 ft. by 1 ft. 6 in. Differential thermocouples are embedded at the

mid-points of the copper sections directly opposite each other on the inside and outside of the plywood, so that the temperature difference across the walls, floor, and ceiling can be measured and recorded electrically. The rate at which heat is flowing through the plywood can be determined from a knowledge of its thermal conductivity and the temperature difference between the inner and outer surfaces. The thermocouple wiring system is arranged in such a way that the heat flow can be measured through any of the individual sections or any group of sections such as a complete wall. The material of the walls was selected to give as low a heat capacity as possible, consistent with suitable thermal conductivity and mechanical strength.

The whole of the air entering the cabinet is controlled automatically in such a way that the pressure is the same inside as outside. The appliance then operates under conditions of natural draught, and risk of leakage is reduced to a minimum. The rate of air flow into the cabinet is automatically recorded.

The conditions of air movement and temperature in the chambers surrounding the cabinets must be kept constant, and for this purpose two fans are employed, one in an enclosed space underneath the cabinet and one above it, producing an air flow around the cabinet. Air leaving the upper fan can pass through a duct to the lower fan to be re-circulated, or can be rejected to the atmosphere, in which case air from the outside is taken in by the lower fan.

For summer-time use and for appliances of high heat output, cooling is provided by a refrigeration plant, which feeds cooling batteries in the ducts leading from the input fans in two of the chambers. The air can thus be chilled when it passes through the fan ducts. The temperature of the air around the cabinet is maintained constant by means of inter-connected dampers in the air ducts, which control the proportions of fresh and re-circulated air, and by the thermostatically controlled cooling batteries. An auxiliary fan with flowmeter is mounted above the cabinet and can be used to extract ventilating air from within the cabinet when desired.

The Control Room

The control room on the first floor is 52 ft. long by 10 ft. wide and is connected by means of air-locks to each of the four cabinets. As far as possible all of the instrument readings are automatically recorded in the control room and a separate wall-mounted control panel is provided for each cabinet, each panel having a complete set of instruments and controls. These comprise a six-line recording potentiometer, the controller for the constant-temperature chamber, remote control switches and indicator lamps, and, in addition, various terminal boards and electric supply points. The recording potentiometer can be linked to instruments inside the cabinet and to the wall thermocouples through suitably placed terminal boards. The automatically-controlled air supply to the cabinets is drawn from the control room, and the air-flow recorders are wall-mounted underneath the inlet ducts. Equipment is provided for the accurate control and measurement of a water supply for measuring the boiler output of appliances under test. A loudspeaker intercommunication system links the control-room staff with operators in the cabinets and in the smoke-testing rooms.

The Smoke Testing Rooms

The chimneys, which are lined with stainless steel throughout their length, are accessible on all sides in the smoke-testing rooms. In order to minimize the effects on chimney draught of changes in atmospheric conditions, the chimneys from the cabinets terminate underneath cowls inside these rooms.

To measure the smoke, a beam of light is projected across the flue, and its intensity on the opposite side is measured by a photocell, the windows, through which the light beams pass, being heated to prevent smoke depositing on them. Two sets of apparatus are mounted on each flue: One, with a direct light-path across the flue, for dense smokes; the other, with an oblique path, for the lighter smokes. The outputs from the photocells are amplified and fed to a recording potentiometer. The electrical supplies to the light projectors and the photocell amplifiers are specially stabilized, so that the record of smoke density is unaffected by variations on mains voltage or frequency. A smoke sampler can be inserted in each flue to enable the concentration of smoke to be directly determined to calibrate the photocell equipment.

A laboratory has been equipped on the top floor for calibration work and for research into thermal measuring techniques, while a photometer room is installed on the second floor for work in relation to the optical equipment for measuring smoke density. Office accommodation is provided on the first and second floors, and there are two computing rooms on the top floor. Fuel is stored in bays on the ground floor, where it is sampled and weighed into containers before being conveyed by a lift to the control room.

After 44 Years' Service with the Nottingham Gas Department, Mr. G. Eden retired from the post of transport attendant on June 30, his 65th birthday. He received a gold watch from his workmates in recognition of his service to the Department and friendship to them, and also a small cash token.

AN EXHIBITION UNDER CANVAS

The Portsmouth Industrial and Trades Exhibition, held on the Castle Field, Southsea, closed on June 26. It was a remarkable exhibition in many ways. The project was new because a large exhibition under canvas had never before been held in the area. It was also daring, because the largest single-span tent ever to be used in England was to be erected within a stone's throw of the sea front. The site for the Portsmouth and Gosport Gas Company's stand was in the centre of this huge tent which was to house more than 80 stands. Two smaller tents joining the main tent at right angles were planned to hold another 30 stands. On June 3, in spite of high winds and rain, the main tent was erected. Stand building was well ahead of schedule,

The attractive stand of the Portsmouth and Gosport Gas Company, which had to be completely rebuilt after the storm.

when, on the night of June 6, the wind rose to gale force. Parts of the tent began to tear, and the exhibition authorities, faced with complete loss, welcomed the assistance of 150 naval ratings sent from the Royal Naval Barracks. Throughout the night gallant but unavailing efforts were made to save the tent and the stands.

The exhibition field on "the morning after" was a sight to be remembered. Tattered canvas, shattered woodwork, and torn cover-board lay in pools of water all over the ground. This was an "ill wind." A meeting of the exhibitors was hurriedly called and it was decided to enlist the help of all the sailmakers in the area to repair the tent. This was done, and the tent was repaired and hoisted again in 30 hours. The replacement of materials and the serious loss of time gave standfitters and exhibitors many anxious moments. The exhibition was triumphantly opened at the advertised time on June 12 by the Lord Mayor of Portsmouth.

The destruction of the tent had its compensations. Local newspapers printed pictures of the damage and many columns of reading matter gave the exhibition an invaluable boost. Even the London papers joined in. The B.B.C. gave details of the damage, followed by progress reports.

Like many others, the Portsmouth and Gosport Gas Company's stand had to be completely rebuilt and it was only by the determination and happy co-operation of all concerned that the stand was completed in time. Planned and designed by the Company's own staff, the industrial and commercial section displayed the equipment most suited to the area, and a domestic section, with a model gas-works (loaned by the Watford and St. Albans Gas Company) as a central display, made good use of available space to present the more modern types of domestic equipment. More than 112,000 people passed through the turnstiles during the 13 days the exhibition was open.

1948 "JOURNAL" DIRECTORY

In order to keep the Directory information up to date, the following alterations and corrections which have been notified during the past month should be noted in the 1948 issue of the "JOURNAL" Calendar and Directory:

Page 32.—GAS LIGHT AND COKE COMPANY.—Delete S. H. Collins, *Jt.Ch.Acct.*, leaving O. W. Wells, *Ch.Acct.*, instead of *Jt.Ch.Acct.*

,, 38.—HOLYHEAD AND NORTH WALES GAS AND WATER CORPORATION., LTD. — A. I. Jones, *M.D.*, instead of *M.D. & S.*, W. O. Hughes, *S.*

,, 58.—PORTLAND.—J. H. Wilkinson, *E. & M.*, vice F. J. Smith.

,, 62.—RYDE, I.o.W.—Delete F. W. Taylor, *E., M., & S.* (deceased).

,, 96.—ROTHESAY.—R. M'Fie, *E. & M.*

,, 161.—INSTITUTION OF GAS ENGINEERS.—*Secretary*, W. T. K. Braunholtz, M.A., Ph.D., F.R.I.C., add O.B.E.

PARLIAMENTARY NOTES

ON June 10, the Member for Twickenham asked the Economic Secretary to the Treasury if he had seen the Government appeal for "More and More Production" on a poster, the main feature of which is a factory chimney belching black smoke; whether he is aware that black smoke represents unconsumed fuel; and whether he would withdraw the poster and substitute another emphasizing that the prevention of smoke, rather than its emission, assists production. Mr. Jay replied that he had, and the poster had been displayed for 14 weeks; it was shortly to be replaced. He pointed out that they did not wish to run counter to the smoke abatement movement, with whose aims the Government was in entire sympathy.

On the same day the Member for Enfield asked the Minister of Fuel and Power what steps had been taken to establish the Consultative Councils, as provided in Section 7 of the Electricity Act, 1947. Mr. Gaitskell said that he had consulted all the necessary organizations but had not yet had final replies from them. Another questioner pressed the Minister to state when the councils were likely to be set up, and the reply indicated that the Minister had to get suggestions from the various organizations he had mentioned earlier.

The electricity breakdown on May 23 came up again in questions by two Members. Mr. Gaitskell told them that the Chairman of the British Electricity Authority had made a very full statement on May 24, and that he had nothing to add to it. The causes, he said, were fairly clear—shortage of plant and an excessively bad spell of cool weather, combined with two breakdowns on the line. A Member asked if there could not be an immediate agreement to postpone all discussions on the Gas Bill until the Minister received a report on the breakdown as, nationalization was obviously not working.

On June 15 the Member for Fife, Western, asked the Secretary of State for Scotland how many constructional schemes for the generation of electrical power by the North of Scotland Hydro-Electric Board were in progress at the end of May, 1948; how many men were employed; what the capacity of those schemes was in kilowatts and the annual output in units per year; what would be the completion dates of each unit; and how many schemes were scheduled for commencement in 1949 and 1950. Mr. Woodburn, in a written reply, showed that 11 projects were in hand and 5,500 men were employed on them. The generating capacity would be 436,800 kilowatts and the estimated annual average output 832½ million units of electricity. Six further projects had been submitted by the Board to him; if confirmed, four would be commenced this year, and two in 1949. By the winter of 1949-50 the amount of electricity available should be 175,000 kW., increasing by 1952-53 to 570,000 kW.

Mechanization in the Mines

On June 16 the Member for Fife, Western, asked the Minister of Fuel and Power how much coal was cut by machinery in Scotland in 1947; what percentage of total Scottish output this constituted; in how many mines in Scotland cutting machines had been installed; and how many machines were in use in that year. The figures given by Mr. Gaitskell showed that 19,773,000 tons, or 85% of the total output, was cut by mechanical means; in December, 1947, there were 238 mines in which coal cutting machines were used and machines totalled 1,653 at the end of the year. The Minister also gave figures of the coal conveyed by mechanical means.

The Compensation Regulations, Electricity Act, came up at question time on June 17, when the Member for East Grinstead asked the Minister of Fuel and Power which were the trade unions and other employee organizations with which he was negotiating in regard to the terms of the compensation regulations; what was the state of the negotiations; and when it was likely that they would be completed.

Mr. Gaitskell: "My officials have discussed the basis on which these regulations should be drafted with the Employees' National Committee and other associations. Further consultations are pending and I cannot say when they are likely to be concluded." The enquiring Member then asked if the Minister would bear in mind that this was his personal responsibility and not that of the British Electricity Authority; and that the continued absence of regulations was causing considerable alarm and despondency among employees who did not know their future. Mr. Gaitskell: "No one has ever suggested that the responsibility is not that of the Minister. A number of associations and trade unions have to be consulted. This is a complicated matter and is bound to take time."

Nationalized Industries

This was followed by the Member for Fife, who asked the same Minister what steps he takes to maintain contact with the operations of the National Coal Board and the British Electricity Authority, whether regular consultations are held with the Boards, and if individual members of the Boards are free to consult him on matters of policy. Mr. Gaitskell said that his officials were in constant touch with the officials of the Coal and Electricity Boards, and that he had made a practice of maintaining informal contact personally with the Chairmen at frequent intervals. Individual members of the Boards, other than the Chairmen, would obviously not be free to consult him on matters of policy, which were the Boards' responsibility.

The Member for Fife also asked the Prime Minister if he intended to set up an enquiry into the working of the nationalized industries, and what would be the nature and scope of the enquiry. Mr. Morrison dealt with the Member by saying that the answer was no. The Member for Louth then asked if the Government was satisfied with the working of the nationalized industries so far. Mr. Morrison: "This is a Government which has virtue on its side . . . and always sees possibilities of improvement. Therefore the assumption in the hon. Member's question would not be accurate."

The Member for Cambridge University brought up the Consultative Councils set out under Section 7 of the Electricity Act, and Mr. Gaitskell referred him to a reply he had given the week previous. (The second paragraph in these notes covers the subject.) The Member in question deplored the fact that no Councils had been appointed, and added: "In view of the fact that the Councils are charged specifically with consideration of any variation of tariffs where the variation of tariffs has taken place without consultation with the council, can this be held to be in order? Mr. Gaitskell: "The difficulty is that I have to consult a very large number of associations and some of those associations have not yet sent in proposals for membership of these Councils. I cannot proceed to the final selection until I have those particulars. In the meantime, the electricity area boards are, I know, in various cases consulting with the associations before they make changes." The Member for Ecclesall: "Is the Right Hon. Gentleman aware that this is his responsibility and he cannot ride off by blaming other people, and that either he should have started earlier or he should get on with the job now?"

Mr. Gaitskell said that he was blaming no-one; he was stating facts; whereupon the Member for Cambridge University asked: "Is the Right Hon. Gentleman satisfied that the variation in tariffs is valid in view of the fact that the Councils were not consulted?"

Mr. Gaitskell: "Oh, yes, there is no doubt about that."

SCOTTISH GAS DEVELOPMENTS

The Scottish Council (Development and Industry) has indicated the possibility of development of industrial gas production in its "Chemical Industry of Scotland" report just issued. The expansion of welding technique during the last 20 years has been responsible for parallel increases in oxygen production. Other gases, such as acetylene, coal gas, carbon dioxide, and nitrous oxide, require special individual preparation, but the problems of compression, cylinder filling, and distribution are common to all.

"In Scotland," the report says, "the manufacture and distribution of compressed gases, excluding carbon dioxide, is in the hands of one or two firms. They represent to some extent a secondary industry in that production must wait upon the development of consumer markets. Thus the rare inert gases are not produced in Scotland owing to lack of the demand. Should a larger production of gas-filled lamps and signs develop, the supply at present drawn from England could be substituted by a Scottish supply. The industry in Scotland has, however, been called upon to meet a very large demand for most of the commoner gases, and factories are in existence at all the main industrial centres."

Discussing tar products, the report says: "At the moment, some 200,000 tons per annum of crude tar are produced in Scotland, but this amount may be substantially varied by Government plans for the utilization of raw coal. At the same time, in view of the need for deriving every possible advantage from the national assets of raw coal and the important chemicals available therefrom, it is probable that the amount of coal tar available in Scotland will increase, rather than decrease, in the immediate post-war years.

"The market for pitch as such has been mainly on the Continent, where it is largely used as a briquetting material. In the years immediately preceding the war, this market was contracting rapidly, and although there is no doubt that accumulated demands will call for a large immediate export trade, it is uncertain how long this increased demand will continue. On the other hand, the state of coal production in this country calls for a larger use of briquettes made from coal slack and pitch. Hot liquid pitch is being used directly as a fuel, but can hardly hope to compete, except at or near the point of production, with fuel oil from either coal tar or petroleum. A considerable amount of work has been done on the carbonization of pitch to produce pitch coke, and some experimental work has been carried out on the gasification and hydrogenation of pitch. Such investigations should be pursued in order that fresh fields may open for a product that has often been difficult to sell.

"It is to be hoped that the newly formed Coal Tar Research Association will find a place within its organization for a section operating in Scotland, where, owing to differences in coal and methods of carbonization, special problems have to be tackled."

AVOIDING THE NARROW-MINDED SPECIALIST

A GERMAN VIEW OF EDUCATION

(From Our Special Correspondent)

PROFESSOR J. KÖRTING, of the Gas Institute, Karlsruhe, discussed in the March issue of G.W.F. education of gas engineers in Germany. In 1921, he suggested, Wilhelm von Oechelhaeuser had made specialization and lack of an all-round education responsible for the internal collapse of Germany. He had regarded the separation of Polytechnic and University as an outward sign of a deep split between various sections of society. To-day, continued the author, opinions are heard which seek to modify the educational system so that these mistakes, with international consequences, should not be repeated. There is condemnation of specialization ; educational material and methods are being examined.

The gas industry, of course, needs specially trained engineers. The results of a specialized training have been of obvious advantage to the industry and to graduates, as can be seen by the life-work of Bunte ; and Oechelhaeuser, in one of his great speeches, praised unreservedly the Karlsruhe method of training.

The apparent contradiction in this can be explained easily. Training for a specialized subject need not, and must not, produce a one-sided specialist. Karl Bunte himself, with his long teaching experience, made clear the most important aspects of training in 1939 (G.W.F., 82, p. 199) : "Through the combination of two subjects, chemistry and machine construction, there should, of course, not result superficiality in both. It must be avoided that overburdening of the course should discourage people from taking it ; but it must also be avoided that fewer requirements should encourage the sluggards to come in. Therefore, a general course in chemistry or an equivalent course in machine engineering should provide the grounding ; and only where and when specialization begins within each of these two subjects should an ancillary subject be embarked upon. All technical training should proceed in three stages :

(1) General grounding in mathematics and natural sciences, mathematics, physics, chemistry, and, if possible, geology and botany.

(2) Uniform training in the main subject, such as chemistry or machine engineering.

(3) Application of the acquired fundamental knowledge either towards specialization in the subject taken (chemistry for the scientist, machine construction for the constructional engineer), or towards a branching out into an ancillary subject for the general engineer.

All students, no matter what their ultimate aim, must go through stages (1) and (2)."

The Aims at Karlsruhe

The "how" and not the "what" of lectures decide whether or not a student develops into a narrow-minded specialist. Every gas engineer knows how many-sided gas production technique is, and that a good knowledge of all ancillary subjects is essential. We encourage, said Professor Körting, a broad general training which may include economics, economic geography, psychology, history, and languages ; we do not set out to produce narrow-minded specialists.

About present-day education problems, the author mentioned that during the last pre-war years many trained gas engineers had to be released to enter allied industries. The war had diminished the number of advanced students. It was feared that for some time to come there would be no graduates for gas engineering. Therefore the Institute at Karlsruhe decided to take a number of generally educated young chemists, chemical engineers, and constructional engineers, and to acquaint them with gas engineering through intensive courses and through occupation with jobs arising at the Institute. The chemical control work at the Karlsruhe Gas-Works is of special value. Several gas-works are ready to take these students in due course ; several students are already employed. A number of men who have had experience at gas-works now undergo training at the Institute for a few months.

Extension Courses

Extension Courses, popular for 30 years, for already trained and practising engineers, were resumed in 1946. Housing and food shortage curtailed these courses from two and a half weeks to one week. As this course is felt to be too short, it will be lengthened as soon as conditions permit.

Apprentices are still being trained as laboratory assistants, according to the principles of Bunte. It is possible that the theoretical knowledge of those who commenced their training during the war falls somewhat short ; but serious and hardy men are emerging who have not been spared any practical experience. They have been called in to assist more frequently than they would have done under normal conditions, and there exists an intimate collaboration between them and their learned co-workers. Examination results are very good ; and gas-works could do with a greater number of assistants.

PURGING A GASHOLDER CROWN USING SOLID CO_2

By STANLEY JONES, M.I.Chem.E., M.Inst.Gas E., M.Inst.F.,

Deputy Gas Engineer and Manager, Middlesbrough Gas Department

AN operation of some interest was recently carried out by the Middlesbrough Gas Undertaking, when a small gasholder situated at a small gas-works in one of the undertaking's outlying districts was purged by means of "Drikold"—*i.e.*, solid carbon dioxide—prior to demolition.

When the question was first raised, consideration was given to the following methods of purging :—

(*a*) By means of a purging machine.

(*b*) By liquid CO_2 in cylinders.

(*c*) By solid CO_2.

Since we had no purging machine of our own, the machine and operator would have to be hired from a considerable distance, and we might not have been able to carry out the operation at a time entirely suitable to ourselves. In view of the small size of the holder and the inconvenience of the method, the expense of the hire and transport of a machine was not justified. The choice then lay between using cylinders of CO_2 or "Drikold."

The respective costs were the same—3¾d. per lb. of CO_2—but the use of cylinders of CO_2 would have involved the fitting of pipes to carry it into the holder, whereas the "Drikold" simply had to be dropped into the water in the holder tank. It was decided, therefore, to use "Drikold." The volume to be purged was 4,500 cu.ft., and it was decided to use this volume of CO_2. The cost was as follows :—

4,500 cu.ft. of CO_2 as "Drikold," *i.e.*, 5 cwt. at 3¾d. per lb. = £8 15s. 0d.

"Drikold" is supplied in 28 lb. blocks, four of which are housed in a 1 cwt. container. The blocks and container are well sealed, but evaporation losses are inevitable. Even though the blocks were delivered to the site on the morning of the operation, it is estimated that the actual weight of each block would be between 25 and 28 lb. when used. Twenty blocks were used—*i.e.*, five 1 cwt. containers each containing four blocks.

Prior to the operation an experiment had been carried out in a water tank in the laboratory, and it was found that a 20 lb. block immersed in water evaporated completely in about two hours. It was assumed therefore that any weight of similarly sized blocks immersed in a reasonable volume of water take the same time to evaporate. It was necessary to remove the holder, which had a capacity of 14,500 cu.ft., in order to make room for replacement by a new high-pressure holder. The original holder was very old and in a poor condition, and was only used on Sunday mornings in order to give added pressure during peak-load periods.

The holder was in use on the Sunday morning previous to purging, and on the Monday it was emptied and the inlet and outlet syphons sealed with water. On the following Wednesday the common inlet and outlet main was cut and capped, and the purging operation was effected on the Thursday morning. The actual purging was carried out by removing the manhole cover above the inlet pipe and throwing in the blocks of "Drikold." This operation was carried out in two minutes, and a wooden plug was removed from a 3 in. hole which had been made in the top of the crown. The manhole cover was then replaced. CO_2 was evolved rapidly for about one hour, after which it gradually decreased, and the falling-off continued until it ceased abruptly after about five hours. The 3 in. plug was then replaced and left in overnight. The following day demolition was commenced. The fact that the CO_2 took longer to be completely evolved than

was anticipated was put down to the immersion of the blocks of CO_2 in silt and tarry sludge at the bottom of the tank. During the course of the operation, "Orsat" tests for CO_2 and O_2 were carried out continuously in order to determine the proportions of CO_2, air, and gas present.

The initial analysis of the contents of the holder prior to purging approximated to the following :—

Air	=	31.4%
Gas	=	68.6%

The reason for the presence of air was put down to leakage while the holder was grounded from Monday to the following Thursday morning. The operation was therefore not ideal from the point of view of avoiding the presence of air throughout the operation ; but explosive mixtures were only formed in isolated pockets, and these mixtures were all near the outer explosive limits for gas and air. The final result, after diffusion had taken place overnight, was a completely safe mixture.

The conclusions which have been drawn from the above operations are as follows :—

1. The use of solid CO_2 as a means of providing gaseous CO_2 for a purging operation is rapid, simple, and effective.
2. Its use would only apply to small holders where the cost of the hiring and transport of a purging machine would not be justified.
3. Its use eliminates the necessity of fitting the pipes and valves associated with a purging machine and CO_2 in cylinders.
4. Before purging a holder, the infiltration of air should be avoided. Thus, in the case of an old holder which is known to be leaking, it should be kept under gas pressure until the purging is commenced, and all leakages should be stopped with clay.
5. If possible, immersion of the CO_2 in tarry sludge at the bottom of the tank should be avoided. This could be accomplished by placing the CO_2 in buckets or suitable containers which could be lowered through the manhole and suspended by ropes, the manhole cover being then sealed with clay.
6. The use of solid CO_2 also suggests itself as a convenient method of purging small tanks such as benzole and petrol tanks and small gas containers before repairs are carried out. In the case of a tank which has contained a liquid fuel, it is of course obvious that all traces of the volatile liquid should be removed before purging is carried out.

News in Brief

Bingley Gas Department reports a gross profit of £5,915 for the year ended Mar. 31, as against a loss of £866 for the previous year.

Over 500 Students in the United Kingdom sat for the qualifying and final examination in "Sales Management" conducted by the Incorporated Sales Managers' Association in May. Results are expected to be available on Aug. 1, and to meet the convenience of many students the Association has agreed to hold a second examination in 1948—Dec. 2, 3, and 4. Particulars of these examinations may be obtained from the Secretary, 23, Bedford Square, London, W.C.1.

Mr. A. McDonald, General Manager of the York, Harrogate, and District Group of Gas Companies, presided at the annual sports day organized by the Committee of the Harrogate Gas Company's Sports Club before a crowd of upwards of 400 employees and friends. Invitations had been issued to York, Malton, Easingwold, Otley, and Yeadon to partake in the sports, and members of these constituent companies took part in many of the events. A well-balanced programme, including relay, cycle, obstacle, and novelty races, and a tug-o'-war, provided excellent entertainment and sport and, at the conclusion, Mrs. F. W. Allum, wife of the Assistant General Manager, presented the prizes and trophies.

Lectures Given to Schoolchildren on gas manufacture and utilization by the Coventry Gas Department in conjunction with the local education authority terminated recently with the holding of a competition for the making of the gas-works model, equipment for which was issued by the British Gas Council. Twenty-one schools took part in the competition, and Mr. D. E. E. Gibson, the City Architect, judged the final entries. The successful teams were given a conducted tour of the Foleshill Works, and at the end of the tour each team was presented with a certificate for display in their science class rooms. Over 3,000 children attended the lectures, and the Department has already been asked to give a similar course of lectures as soon as possible.

Arrangements Have Been Completed for the transfer of Holmfirth gas-works property from Huddersfield Corporation to Holmfirth Urban District Council. The works were built in 1840, the production of gas ceasing in September, 1943. The plant is to be removed. In August, 1939, the Holmfirth Gas Light Company sold out to Huddersfield Corporation, which acquired the gas undertakings at Newmill and Honley at the same time. Holmfirth Council is to be given possession of the property on July 31 with the exception of an office and showroom, which will be temporarily rented by Huddersfield Corporation. The Corporation intends to lay a high pressure gas main from Honley to Meltham.

A Dinner was given by George Wilson Gas Meters, Ltd., on June 3, at which the Coventry and District Sheet Metal Workers Football Challenge Cup was presented to this year's winners. The cup was given by the Company to the sheet metal workers in 1936 to replace a shield which had been made by the same Company and presented in 1911. Mr. R. C. Baston, Secretary of the Birmingham and Midland Sheet Metal Workers' Society, in proposing the toast of the firm, referred to the happier spirit which now prevailed in industry generally. He felt that such convivial evenings did much to cement these friendships. Mr. W. D. Wilson, in his reply, expressed the pleasure of the Directors in being able to act as hosts, although he regretted that on this occasion his Company were not participants in the final. Mr. F. C. Wilson also spoke of the goodwill created by the competition, in which so many local firms took an active and interested part. The Deputy Mayor suitably replied, together with the Assistant Managing Director of the Standard Motor Company, Mr. Alick S. Dick, and the General Manager of the Coventry Radiator and Presswork Co., Ltd., Mr. W. H. Lenton.

The International Scientific Film Association is holding its second congress in London, from Oct. 4 to 11. Details are obtainable from the Scientific Film Association of Great Britain, 34, Soho Square, London, W.1.

Election of Honorary Officers for 1948-49 was announced as follows at the annual general meeting of the Institute of Welding on June 30: President, J. H. Paterson, D.Sc., F.R.I.C.; Vice-President, O. V. S. Bulleid, M.I.Mech.E.; Treasurer, W. E. Harriss. A vote of thanks to the outgoing President, Mr. J. L. Adam, C.B.E., M.I.N.A., was moved by Sir Stanley Goodall, K.C.B., and carried with acclamation. The Council presented to Mr. Adam a replica of his photograph, specially taken for preservation in the Council Room of the Institute.

An Application by the employees of the Dundalk Gas Company for an increase in wages of £1 per week and for either a reduction in the hours of shift workers, or payment of double time for Sundays and holidays, was heard by the Eire Labour Court on June 29. It was stated that the Company had offered 7s. 6d., but that this had not been accepted by the men. For the Company it was pleaded that owing to the present economic circumstances, both national and local, the Company could not agree to a reduction in the working hours for shift workers. To concede even a claim for 11s. would place in jeopardy the maintenance of current gas prices in Dundalk. The present time was not opportune for a reduction in working hours. An increase of 7s. 6d. would cost the Company £357 a year and 20s. a week would cost £936. The Chairman said that the Court's recommendation would be issued after consideration.

INTER-GAS COMPANY TENNIS

The annual lawn tennis tournament between the Bedford, Cambridge, Northampton, and Watford and St. Albans Gas Companies took place in the picturesque setting of Cassiobury Park, Watford, on June 26 under ideal weather conditions. Among the large number of visitors were the Mayor and Mayoress of Watford (Alderman and Mrs. H. Coates), Mr. T. C. Battersby, General Manager and Chief Engineer of the Watford and St. Albans Gas Company; Mr. J. Hunter Rioch, Managing Director of the Cambridge University and Town Gas Light Company; Mr. H. Banks, Chief Engineer of the Northampton Gaslight Company, and many other officials and their wives.

During the morning Cambridge beat Bedford 5—4, and Watford beat Northampton 7—2. The second round, played in the afternoon, resulted in Northampton beating Cambridge 6—3, and Watford beating Bedford 7—2. During the tea interval the players and spectators witnessed an entertaining challenge set of singles fought by the challenger, the Mayor of Watford, and his acceptor, Mr. K. C. Rees, Watford Works Engineer. The final round, played in the evening, resulted in Northampton beating Bedford 7—2, and Watford, certain winners, retaining the shield for the third successive year by beating Cambridge 8—2.

In the evening the Mayor and Mayoress, together with officials and ladies of the participating undertakings, shared the company of players and friends at dinner, presided over by Mr. Battersby. The toast "Our Guests" was given by Mr. Battersby and responded to by the Mayor. Alderman Coates then presented the Challenge Shield to the victorious Watford team. The trophy was accepted by L. Sealey, Watford Captain, whose words of thanks and encouragement to those defeated were warmly applauded by his colleagues. Other speakers were Mr. Hunter Rioch, on behalf of Cambridge, Mr. H. Banks, of Northampton, and Mr. R. Turner, of Bedford.

FUNCTIONALISM AS A TOOL OF MANAGEMENT

FOLLOWING is a report of the discussion on the paper on "Functionalism as a Tool of Management," which Mr. C. H. Leach, M.A. (Oxon), A.C.A., General Manager and Secretary of the Liverpool Gas Company, presented at the Institution of Gas Engineers' Annual Meeting in London on June 9. The paper (Communication No. 336) was published in the "JOURNAL" of June 23 and 30 (pp. 754-765 and 807-814).

Col. **H. C. Smith** (Tottenham): When Mr. Leach asked me to open the discussion on his paper, I gladly consented, as I knew before reading it that whether I agreed with what the paper contained or not, it was certain to be provocative and full of interest.

Take the title "Functionialism as a Tool of Management." The first thought one has is, what on earth does he mean? I looked for the word "functionalism" in three dictionaries, and I did not find it in one of them. I came to the conclusion either that Mr. Leach had a better dictionary than I had, or that he had coined a new phrase—either of which possibilities I was quite prepared to believe. The only thing to do, therefore, was to accept Mr. Leach's definition as "the placing of the whole responsibility for all activities of one type upon a single officer."

I know what "tool" generally means, but I thought I had better check up, as Mr. Leach might have found some extraordinary definition of this everyday word. I found, among other things, that a tool is "a person used as a mere instrument by another—a catspaw." The title of the paper, therefore, seems to mean "the placing of the whole responsibility for all activities of one type upon a single officer who is used as a mere instrument by another (presumably the general manager), the single officer being a catspaw." I do not know whether the single officer in question would care to be described in this way, but the title of the paper does point to the possibility.

Officers with Full Authority

I should prefer, having decided what operations it is necessary to carry out, to select a suitable officer to take charge of each of these operations, giving these officers full authority to perform their several functions while at the same time expecting them to accept full responsibility for the successful carrying out of their allotted duties under the over-riding supervision of the general manager, who would be available to encourage and advise as occasion required. This, I think, is probably what Mr. Leach has in mind.

The natural thing to do on first reading the paper is to check up the figures given of operatives employed in the various divisions at Liverpool against those in one's own undertaking. A difficulty immediately arises here as so much of the work at Liverpool is farmed out to specialist contractors. While it may be more or less common practice in other undertakings to let out some work in this way, the amount and types of work so dealt with varies considerably, and it is difficult, if not impossible, to make comparisons.

I would hesitate to ask for more when Mr. Leach has already given so much, but the value of the paper would have been increased if the costs of performing the various operations had also been given. I know that, here again, comparisons are not entirely satisfactory, owing to variations in methods of ascertaining costs, but this additional information would have been helpful.

There are, of course, other factors which will affect comparisons between different undertakings such, for instance, as the density of the area supplied. For example, the Liverpool area of supply of 100 sq. miles contains about 40,000 more consumers than the Tottenham Company's 411 sq. miles. Only three showrooms are required to service the district at Liverpool as against 22 at Tottenham.

Apart from the actual size of the area, I believe that it is the habit in most provincial cities for the population to tend to come into the centre to shop and transact business. This factor makes comparison difficult with an area such as is covered by the Tottenham Company, in which there are 17 local authority areas, including boroughs, and urban districts, each of which is, in effect, a city centre for shopping purposes.

Even allowing, however, for the comparatively compact area at Liverpool, it would appear that there must be some special circumstances which enable an undertaking of the size of Liverpool to give an efficient service with so little decentralization.

The Contracting-Out Principle

The paper describes a serious attempt which has been made to strip off all extraneous functions which contractors might be in a better position to handle. It is contended that contractors are in a position to absorb the additional work without increasing their own overheads, thus saving the company the expense of maintaining departments or sections which are often not fully equipped to carry out specialist work. It would seem that nothing has been allowed to prevent the attainment of this object, and existing departments have been dispersed or dispensed with quite ruthlessly after it had been determined to transfer or eliminate their functions. The thoroughness with which this policy has been carried out is illustrated in the paper, which shows that when it was decided to let out the decorative painting to contractors, the whole department was dispersed and the remaining paint and other materials belonging to it were sold. I am entirely in agreement with the principle of letting out certain work to contractors. I believe that a better canteen service can generally be provided, particularly in these difficult days of rationing, by a firm of experts. Transport peak loads can be well looked after by contractors. The same applies to carcassing of new houses. This practice was adopted very successfully many years ago at Tottenham.

I was interested to read that the construction and maintenance department had been integrated and placed under an engineer directly responsible to the divisional head and at a level equal with works managers.

Potential Salesmen

Mr. Leach finds that it is only possible to apply the contracting-out principle to some of the trades concerned in this work. I entirely agree with him here. An outside contractor might do much of the work of construction and maintenance more cheaply than can be done by direct labour, but cost is not the only problem we have to consider. One must pay something for insurance. Continuity of the supply of gas is of vital importance, and an adequate staff for dealing promptly with emergencies must be readily available. Mr. Leach realizes this when he says that it has been found necessary to leave skeleton staffs of maintenance men under the works manager.

We have endeavoured at Tottenham to achieve a very similar result to that aimed at by Mr. Leach by making the maintenance staff at our largest works contractors for the smaller works. Each of the smaller works has its skeleton maintenance staff, but it can call on the construction and maintenance department at our main works for assistance when this is required.

When using contractors for district work, I prefer to employ these where they do not come into contact with consumers—for instance, in the servicing of new buildings. We have over many years tried to inculcate into all our employees the idea that everyone is a potential salesman. While that practice can achieve fairly successful results with the company's own employees, I do not think that there is much chance of obtaining the same results with contractors' employees, who are obviously interested in their own employer more than they are in the gas undertaking. We endeavour so far as we can to see that the same district officer always deals with the same consumer, and when work has to be done in the consumer's house that the same fitter attends to do that work. The Liverpool method would seem to destroy or, at any rate, to lessen considerably the opportunity for contact between the company's employees and its consumers. While the short-term policy may be an economical one, there is to my mind a very serious danger that in the long run this policy may lead to a lessening in sales progress. If the Liverpool practice developed to its logical conclusion, it would appear likely to leave the gas undertaking in the position of being manufacturers and distributors only, leaving the development of utilization to the customers themselves or to the more enterprising local ironmongers and plumbers.

Good Service Worth Paying For

Service to the consumer is costly as practised by most progressive undertakings, and it cannot be provided without the cost being reflected in the charge per therm, but the cost of efficient sales and service organization can be covered to a great extent by direct charges made for goods, materials, and labour supplied. I believe consumers are willing to pay for this provided they are satisfied that they are getting good service.

In many undertakings considerable expense has been incurred in training district fitters to become first-class craftsmen. Under a scheme approved by the London Regional Council, the training and qualifying period is one of seven years. After a man becomes a first-class craftsman, refresher courses are still given to maintain an up-to-date staff. I cannot believe that a contractor is going to this length in order to provide craftsmen of equal quality. If the fact is accepted that to install properly the more complex gas appliances necessitates a lengthy training of craftsmen, then the answer to high cost is not the abandonment of this project, but improvement in the methods of operation.

So far as the sales development side is concerned, the impression I gathered from the paper was that an endeavour has been made to fit all business transactions between customers and company into simple well-defined channels, to sub-let the more difficult and possibly to ignore the more complex. This results in

immediate economies. The question which we shall all no doubt ask ourselves, after studying the paper, is how far is this right when considering a long-term policy of development. Considering the economics of satisfactory service is rather like considering the economics of advertising. What returns do we get from our advertising? One very simple way of effecting an immediate reduction in expenditure would be to cut out all advertising. A stroke of the pen will do that. Would any of us say that that would be wise from the long-term point of view?

Incidentally, I was interested to read that there are still some wet meters at Liverpool. Frankly, I had forgotten that such a thing as a domestic wet meter existed. I thought they had gone out of use years ago.

I can only blame the paper itself for my rambling remarks in opening this discussion. It is so full of points to be considered that to discuss it properly would need the preparation of another paper. I shall look forward to hearing what other members have to say. I am quite sure that the paper is one which will lead to a very interesting discussion, and I am personally very grateful to Mr. Leach for it. It has made me think quite a lot and it will be, I am sure, of very great value to all of us. I commenced by discussing the title. Mr. Leach might like a sub-title. You will occasionally read in the personal column of the "Times" an advertisement by a firm who are willing to do for you in your homes all those things which you normally would expect to do for yourself. They go by the name of "Universal Aunts Ltd." I would suggest as a sub-title "Management by Universal Aunts."

Manpower Assessment

Mr. **Alex W. Lee** (General Manager and Secretary, City of Birmingham Gas Department): I have read Mr. Leach's excellent paper through several times, and having done so, I have gained the impression that at some time in his career he must have been in the employment of the City of Birmingham Gas Department, because many of the reforms which he has instituted in Liverpool bring him into line with existing practice in my own undertaking. They have been introduced as obvious developments in administration, and in our ignorance we in Birmingham had not realized that we were indulging in anything so modern as "functionalism." This paper can really be looked at in two ways—as a description of applied "functionalism" or as an account of the organization which has been found most satisfactory at Liverpool. As far as the latter is concerned, Mr. Leach has given an admirable account of an organization which calls for little major criticism.

I was interested in the brief particulars of the Liverpool Gas Company which the author gives in Section III. Judged on the size of the Birmingham and Liverpool undertakings as regards output of gas, the figures of manpower are comparable, but throughout his paper Mr. Leach stresses the claim that the number of employees has fallen considerably. It would, however, be interesting to know the number of contractors' men employed. After all, the work still has to be done, and the contractors' men and women must be taken into account when comparing the total man hours required for the provision of all facilities in different undertakings. Taken to extreme limits, a holding company could say that it had contracted out all its functions except that of higher management and financial control; then, by dividing the output of its subsidiaries by the number of head office staff, a most wonderful quotient would be obtained.

Bulk Purchasing

The organization set out in the paper provides for four main divisions answerable to the directors and the general manager. It does, however, appear to me that in practice there must be others. For instance, reference is made under the office comptroller's division to bulk purchasing of stores. In an undertaking the size of Liverpool, such a purchasing officer must of necessity have to spend something like half a million pounds sterling per annum in his activities, and to my mind he should be directly responsible to the head of the undertaking. Incidentally, is it a good example of functionalism for the general manager himself to combine the arts of organization and control with the function of buying coal, gas oil, and oxide? The office comptroller himself appears to be a man of many parts and to have too many direct contracts, while the labour and welfare officer is left out in the cold, without any contact with the gas-works.

Road transport is, apparently, the responsibility of the sales manager's division, but no mention is made of the officer responsible for the traffic arrangements for coal, coke, gas oil, and the hundred and one other materials which are constantly coming in and going out of the works of the undertaking by rail. As this is such a vital job, I should have considered it worthy of direct contact with the management.

I take it that the Liverpool Gas-works, with their modern equipment, are highly electrified, yet I see no mention on the charts or in the paper of the employment of an electrical engineer. I am surprised that no electricity is generated at Liverpool, and that complete reliance is placed on external supply.

In Birmingham we have brought all the electrical plant and employees under the control of an electrical engineer. Producing electricity cheaper than the town supply, we sell our suplus current to the grid. In our opinion, if a gas-works is to make the fullest use of electricity, in the interests of economy (bearing in mind that it must keep in production 24 hours of the day) a standby supply must be available, since a single supply restricts the degree of electrification that can be adopted.

Mr. Leach makes no mention of staff meetings being held amongst the technical staff or the administrative staff. This is an important procedure in a well co-ordinated undertaking. On the other hand, does "functionalism" mean working in watertight compartments without co-operation and joint discusison?

I find myself in considerable agreement with the broad lines of the paper on its office side. The author implies a bad state of affairs prior to his reorganization, but because he had confined his outline to general propositions it is not easy to select debatable points. I completely agree with his treatment of redundancy following reorganization and mechanization. To my mind, all such innovations should be considered in the light of prospective savings and a comparison made, say, two years after the change in order to see that the nominal spares have not been absorbed. It seems likely that the cost of clerical work will increase, and it may be better to employ fewer staff who can be paid a larger average remuneration than to have depressed standards for a larger number.

Mr. Leach is to be congratulated on tackling the matter of centralized wages. This is one of the problems which is attracting my attention at the moment, and I have hopes that my own undertaking will have a system in operation in the early part of next year.

Catering Contracts

I have still to be convinced that placing contracts in the hands of an outside caterer entirely relieves the undertaking's officials of work. I presume meals at Liverpool are cooked at the undertaking's depots. If so, service is still required to maintain buildings, cooking apparatus, heating and lighting and furniture. Who deals with complaints? Having had many years of excellent experience of canteen running by employees committees, I would hesitate to pass over to outside experts our catering arrangements. The experts' function is to make a profit for his firm: the gas undertaking's function is to organize the best and cheapest meal, without loss to itself, for its employees. If the gas industry cannot do this, what right has it to send out home service advisers or to provide schemes of canteen layout and organization for factories in our areas?

About costing, the author's remarks are of value. Costing, however, can be very wasteful unless results are really utilized as practical means of control as distinct from historical information. The value of a costing system turns not only upon the analyses afforded, but willingness to do something about them.

In regard to the preparation of accounts and his desire to reduce the number of key depressions in mechanical billing I feel that Mr. Leach has paid too little regard to the customer's desire for an intelligible and easily checked account. The omission from the bill of past meter reading, for instance, may well lead to more time-wasting inquiries, and as the past reading had to be recorded on the summary as a proof of the extension and is simultaneously recorded on both the summary and the bill by the national machine, I would prefer to continue what I believe to be a practice which is helpful to the consumer.

Expensive Experiment

I may be wrong, but from the paragraph on gasfitting and maintenance work I gather that the author seems to have set little value on contacts with his customer, i.e., his gas consumer. He opens five branches and then closes them because the saving of walking time does not compensate for branch expenses. This must have been a most expensive experiment. At the same time, he advocates drastic reductions in the gas-fitting and maintenance employees, and is prepared to place district work in the hands of outside contractors. I should not like to see such a change made in my own undertaking. While we, in Birmingham, employ a small number of master gasfitters, I regard our own gasfitters as the means of a very intimate contact with our customers. I want our own customers not only to buy appliances, but to use them, and use them continually because they are satisfied with them. If we have trained our gasfitter in the right way, he will do his job better than, and at least as cheaply as, the outside contractor, and will be the means of bringing repeat orders to his undertaking. A contractor is only seeking further business for himself. You have given him an introduction to your customer, and if he is a good business man he will make full use of it. To-day that may not be very damaging, but in times of bad trade and keen competition, much load that rightly belongs to our industry may be diverted elsewhere. I would also emphasize that whereas the contractor gets the work, the undertaking gets the complaints. Is it not inconsistent to contract out for this work and to keep main and service laying as a function of the undertaking? In this field there are undoubted specialists with all the necessary experience and

machinery, and contact with the consumer is not by any means so close as in the case of gasfitting work.

I cannot quite see how the author reconciles with his doctrine of "functionalism" his excursions into education in founding a pre-entry training school for clerical juniors still attending day school. Many of us feel that the strain put on boys and girls in their endeavours to obtain School Certificate is quite as much as they can carry at school age. What is needed is the retention of the will to learn after leaving school and the cultivation of a desire for knowledge for its own sake.

Vocational training is another matter, and every good employer should be prepared to spend time and money, as we do in Birmingham, in making this available to his employees.

One surprising omission from this paper is in reference to coke. Coke must be a major item of revenue for the undertaking, but does not appear to receive the attention given, say, to the cleaning of offices or the provision of canteen services. Although coke is not mentioned in the text of the paper, I observe from Chart A that while the coke salesman is responsible to the sales manager, coke invoicing is the responsibility of the office comptroller, and coke supervision is under the works manager. It would be interesting to learn if the Liverpool Gas Company's costing system enables the cost of coke to be ascertained, and further, if the price is in line with the cost.

There are many other points in Mr. Leach's paper on which favourable comment could be made. My main impression has been that an exceptional man has had an exceptional opportunity in his reorganization scheme. Whether "functionalism" has anything new to offer may be considered a matter of doubt, for in general the paper seems to apply commonsense solutions to everyday problems of industrial organization. I would like heartily to congratulate Mr. Leach on the very excellent contribution he has made to this Institution's proceedings.

Breaking New Ground

Mr. **E. Crowther** (Newcastle): In providing a platform for the paper before us, the Institution has broken new ground, thereby filling a gap which has always existed, and which was widened when the British Commercial Gas Association merged its functions in those of the British Gas Council, and its annual conferences ceased to be held.

The opportunity to discuss questions of management in open meeting is most welcome. The importance of such matters both psychologically and financially would be difficult to exaggerate, and we are fortunate in having so interesting and provocative a paper as a basis of discussion. I foresee that discussion will be continued in the staff conferences of many undertakings, and that much profit will result therefrom. There is a close kinship between the arts of engineering and of management, in that both call essentially for the application of informed common sense to their problems, and the qualities of mind which are required in a successful manager are such as could, with appropriate training, have made of him an equally successful engineer. By the same reasoning, Mr. Leach will, I think, allow that many engineers, enabled by circumstance to try their prentice hands at management, have learned a good deal about it the hard way, and, rather like the Bourgeois Gentilhomme, have been practising functionalism for the whole of their lives without realizing it.

This is not the time or place, you agree, to embark on comparisons in detail between our own organizations and that controlled by the author of the paper—such comparisons will no doubt be made at the individual staff conferences which I have mentioned.

In reading the paper, I have been particularly interested in the stress rightly laid upon the desirability of cutting out inessentials. How often, in seeking to do this, and equally in assessing the cost of some projected new activity, has one not been confronted with the infuriating fallacy "but the man will be employed in any case." On the other hand, there is, perhaps, an element of risk in the practice of contracting out wherever it appears advantageous to do so. I have recently seen this illustrated in the case of an undertaking which, after some years' complete reliance upon coke oven gas, was unexpectedly deprived of this supply, and had great difficulty in resuming gas making and consequent operations, both technical and commercial, through these having become unaccustomed activities. The moral would seem to be that it is necessary to be very sure that one can continue indefinitely to contract out economically before commencing to do so.

Finding Specialists

Mr. Leach will forgive me, I hope, if I recall to his mind an instance of contracting out carried to the limit. In the City of Philadelphia, the municipal authority decided to purchase the privately-owned gas undertaking. Having done so—some very ingenious financial operations being involved—they then appointed a firm of specialists to run the business as their tenants. The firm pays the City an annual rental, which is treated as part of the operating expenses. These also include an agreed fee retained by the firm, and an annual provision, fixed as to its maximum, expendable upon capital improvements. Gas prices have to be settled by agreement with the municipality, and the lease is open to review at regular intervals. If I may be allowed to anticipate Mr. Leach's reply to the implications of this account, it may well be to the effect that when he can find a firm of specialists better able to do the job than his own team, he will open negotiations with them for a contract to take over the control of the Liverpool undertaking, whereupon he will be able to reduce the number of his company's direct employees to the last two named in his list!

Digressing for a moment, it is interesting to note that the system at Philadelphia might have served as an alternative pattern for the operation of a nationalized gas industry in this country, with certain advantages in causing a minimum of disturbance, in promoting competitive efficiency for the reward of a renewal of lease, and in enabling integration to proceed as circumstances required.

To return to the paper under discussion, if my remaining remarks are concerned with points upon which my opinion does not wholly coincide with that of Mr. Leach, I trust that he will understand that they are not intended as criticisms of the fundamental principles upon which his paper is based, but rather seek to question whether, in fact, he has accurately applied those principles in every case.

Different Techniques

Under the control of the sales manager, for example, he has placed the disposal of all saleable by-products as well as of gas and gas consuming appliances. I suggest that although the word "sale" applies equally to the disposal of both, these processes are not in fact alike, and call for widely different techniques and attitudes of mind. I need only refer to the facts that gas prices, once fixed, remain so for relatively long periods, that the equality clause governs all gas sales, and that competition in this field arises from alternative fuels and services, and not from other supplies of a similar article. In the case of by-products, on the other hand, prices are fluctuating and as much controlled by buyers as by sellers, and competition from similar articles is normal, so that quick decisions, often involving large sums of money, have to be taken. Thus, while in a large organization one executive may successfully control both the care-free gas salesman, and the calculating by-products broker, it is a better test, I suggest, to consider whether in an undertaking large enough to support a one-man staff only in each division, these duties would actually be combined, or whether the disposal of by-products, except perhaps in retain quantities, would not better be handled by the man in charge of the office organization.

Again, somewhat similar doubt may arise as to whether the control of plumbers and gasfitters is not better exercised by a man of the technical outlook of the distribution engineer—in the "one division one man" sized concern—than by the sales manager, although it must be admitted that there are definite merits in having the consumer contact in one control from start to finish. Here, however, Mr. Leach appears to imperil this unity of consumer contact control by introducing a third party, the plumbing contractor, into the picture, and to undo with one hand what he has done with the other. It would seem, looking at the picture as a whole, that in his undertaking he has had to deal with a somewhat over-exuberant growth, and one wonders whether in his necessary pruning activities he may not have cut back some of the fruit-bearing branches more heavily than was strictly necessary.

It is evident, however, that his labours have been profitable, and his methods sound, and I would emphasize that in reading his most interesting and informative paper I have found far more ground for agreement than for criticism. In thanking him for his paper, may I suggest to Mr. Leach an alternative motto, perhaps more flattering to us cobblers?—*Aquila non capit muscas.*

A Timely Approach

Mr. **Tom Brown** (South Suburban): It is very appropriate that the Institution of Gas Engineers should be giving consideration to problems of management and organization at the present time. Under nationalization, with a small number of integrated major units, questions of administration, organization, and management assume added importance, and a paper on a practical aspect is timely.

Much thought has been devoted to principles of management over the last 25 years and there is a considerable literature on the subject. With the growth of larger units and social democracy there has been an increasing demand for what is usually referred to as "good management." As industry becomes increasingly mechanistic, it is only natural that the logic of science should be applied to organization problems. Nevertheless, it must be remembered that an industrial group is just one kind of social group and one of the most important facts about it is that it consists of individual human beings, each with his own personality, and the intangibles are also of considerable importance.

Functionalism is one aspect of organization—a structural aspect. In some respects functionalism is under considerable criticism

to-day. One example of this is the organization of the newly set-up Railway Executives. The members of the Executives are not only responsible for collective decisions but, in addition, each of them is functional. Now, the activities in an undertaking can be divided in two senses. There is subdivision by vertical lines into functions or kinds of activity, and there is subdivision by horizontal lines into levels of authority and responsibility. It is the intersections between these two ways of dividing activities which create most of the problems encountered in organization, and unless they are kept in balance confusion is bound to arise. As Mr. Leach says in his paper, "functionalism is not an end and does not of itself produce economies: It is merely a tool. . ." One of the earliest references to functionalism is the discussion on "functional foremanship," by F. W. Taylor in his work on scientific management. The principle of functionalism may be defined by saying that the responsibilities and activities of an organization should be mapped out into specific primary groups, where possible determined by specialization of function.

When we come to apply this principle, there is obviously much room for difference of opinion and its application must vary according to local circumstances. The ideal organization needs ideal people, and this is an imperfect world. The pattern, therefore, needs to be modified in order that the best possible use may be made of the people within the organization and due consideration given to the individual. I am quite sure that Mr. Leach only intends the details of his reorganization to be illustrative of the application of the functional principle under the circumstances of the Liverpool Company as he found it in 1940. The benefits accruing to the Liverpool Company as a result of the functional integration of duties are indeed remarkable, and I think Mr. Leach is to be congratulated upon what has been achieved. It is plain that the organization of his Company prior to 1940 suffered from many quite considerable defects and the functionalism which he has so energetically installed has clearly shown the defects which existed and indicates improved methods of organization.

The Span of Control

Not all of us would agree that the various functions could be quite so neatly packaged into four boxes, while the office comptroller and his immediate responsibility for fourteen divisions on the chart seems to infringe the well-known principle of "the span of control." It is held that no chief can supervise directly the work of more than five, or at the most six, assistants whose work interlocks. With an increase in the number of direct subordinates working capacity increases arithmetically, but the number of personal relationships increases geometrically. That is why the normal Army ratio is 1:4, while in managerial and administrative work it is safe to say that the number of persons directly responsible to one individual should not exceed six and should, if possible, be less. The limitation is most severe where contact is closest and the quality of work is highest.

While on the subject of the chart, it is noteworthy that whereas public relations is quite properly given a high place, no such standing is given to industrial relations, which should have a much higher place assigned to them than appears to emerge from the chart; they are of great importance to-day. They must have been of considerable importance at Liverpool having regard to the problems of redundancy to which reference is made in the paper. This question of redundancy is a whole subject in itself which does, of course, call for careful and, above all, sympathetic handling, with long-term planning.

Another matter on which I would like to comment concerns contracting out. As a general principle one must agree with Mr. Leach's view that much of this work is best done by specialists and the point of flexibility is of major importance. In dealing with this problem one is usually confronted with the fact of an existing organization and from the financial point of view it is generally marginal or out-of-pocket costs with which one has to deal. In my own organization, therefore, I have first approached it from the point of view of endeavouring to reorganize the existing function and make it competitive with the cost of outside similar services on a marginal basis. While one would not start up a new service unless it were essential from all points of view, on the other hand one would not quickly close down an existing service unless it were also essential to do so from all points of view. On that basis, I have only found it necessary to close down some minor services, and the decrease brought about by reorganization of over 40% in the number of employees per million therms between 1936 and 1947 in the case of my own undertaking is on a comparable basis, and has been controlled largely by intake.

The Costing Function

I agree with Mr. Leach as to the importance of the costing function. The science of costing has made rapid progress over the last few years and ideally the cost executive of to-day must not only have a knowledge of accountancy, but preferably should also have some training in engineering and be something of a statistician. Costing aims at interpreting in terms of pounds, shillings and pence, the change scene in an industrial organization, and some of this can only be done by such methods as regression, analysis and correlation.

On transport, while I agree that the transport department should operate as a contractor to the various other departments, it does not seem quite so clear that it is "mainly an adjunct to customer service," especially when it includes all internal combustion engine equipment, including shovels, dumpers, mobile air compressors, mechanical pumps and rammers. In my own organization, the actual physical control of vehicles is placed under the works engineer, while the records, insurance, &c., are dealt with by the general administrative side.

The few specific points I have mentioned deal mainly with cases where there is a difference of opinion or difference of emphasis. With the greater part of the detailed application of the principle of functionalism as described by Mr. Leach, there can be no question, because it is proved by the results.

I should like to congratulate the author in applying a modern concept of management to solve some of the problems arising out of the methods and practice with which he was confronted in 1940, and I think that many who have not problems of this magnitude to deal with can yet benefit from Mr. Leach's clear exposition of what has been done. In conclusion, I would like to express the hope that the Institution may find time to give consideration to other aspects of management, technique and administrative problems.

Labour Costs Per Therm

Mr. **J. Carr** (Bristol): I would like to congratulate the author on a paper which is fresh and breezy, to say the least, and I had much satisfaction and pleasure in reading it.

It is interesting to have the figures of the total number of employees on the payroll scheduled under their various headings. With a similar set of figures for Bristol the numbers on the manufacturing side amount to 28 per million therms sold, as against Liverpool's figure of 20. The equivalent figure of total employees at Bristol is 66 per million therms sold, compared with Liverpool's 46.5. The question of total number of employees has, however, been receiving careful attention. During the last 12 months reconstruction schemes are on foot which, when they are fully developed, will show a very considerable reduction in the present number of employees. The numbers of employees given by the author present the bald facts of employment in a table which strikes one forcibly.

An interesting figure would have been the total wages paid and its proportion in shillings and pence of every pound received for gas, residuals, rentals, and sales of appliances. The figure at Bristol is 3s. 9.6d. out of every pound, and salaries 10s. 6d. per pound received. If national insurance, pensions, welfare expenditure at 2.9d. is added, the total direct expenditure on employees become 4s. 10½d.

I am in full agreement with the proposals for bulk buying of stores, and the attendant price benefits which accumulate therefrom will be very marked when competitive trading comes more general. The centralization of stores and records, the abandonment of major works stocks, and the duplication of spare parts in each depot will be avoided when central stores issue and control are operating. There will be occasions, however, when the presence of the supplier of machinery spares and appliances must contact the works staff or distribution depot to get the background of a particular failure or faulty appliance first-hand. Without this contact it would be hardly fair to expect a manufacturer who may be under a guarantee as regards quality and working life to remedy a particular fault in any subsequent purchase.

There is one word of caution, however, which I would like to introduce on the question of stores purchases. It is essential from time to time for the technical staff to assist the buyer with certain special purchases of which he would have no working knowledge in actual practice, and whilst he might be buying a given article cheaply on competitive basis, it can possibly, on occasions, be very cheap in initial purchase but costly because it fails to give the required service. It is, therefore, preferable that the buyer has some practical knowledge of the type of maintenance work and the purpose and duty which a machine replacement has to perform.

Self-Supporting Catering

With regard to canteens and contracting out, I heartily agree with the author, but I would go one further and have a catering contract which would be self-supporting without a subsidy clause. At Bristol we have just terminated a catering subsidy contract; our experience was not a happy one. The quality of meals and service was poor, complaints from the men were numerous, and it was a constant source of irritation. Tenders were obtained from a number of catering contractors without the subsidy clause, with payment for all gas used in the Company's five canteens, with uniform charges. A works committee consisting of shop stewards examined the tenders and made the final selection. The change is working well, and complaints to

date are conspicuous by their absence. The resultant saving to the Company will approximate £1,500 a year.

On costing, I think most of us in the industry agree that a centralized costing system to-day is essential, and if I am not mistaken, the majority of undertakings have established costing systems for some considerable time. At Bristol I found that the works managers were not being given an opportunity of being able to fully study their works costs. Manufacturing costs are now available monthly, and are examined at staff meetings, which are also held every four weeks. Faults and excessive expenditure are, therefore, quickly arrested. I have always been very keen on a sound central costing system for control of manufacture and distribution; without it, one is operating blindfold.

Redundancy

The author states that redundancy should never be allowed to stand in the way of more economical working. I am certain this has general approval from us all, as redundancy in staff personnel has been reasonably easy to deal with. In many cases it is possible to transfer personnel to more productive work. The problem is more difficult when dealing with works and distribution personnel, particularly at Bristol, as an agreement exists with the Union operating a right of turn system. This has been in force for some 25 years, and its method is, briefly, that the last man to be taken on by the Company, regardless of his qualifications or ability to do his job, must be discharged if there is redundancy in any department. The result of such a system increases the number of workers in the higher age groups and displaces very often more skilled energetic young personnel, particularly so with stokers and distribution fitters. I know of no other undertaking in the gas industry which operates a right of turn rule when dealing with redundancy. It is a difficult nut to crack; has anybody any suggestions?

The section of the paper dealing with transport under the sales manager's division was of great interest to me personally. I found on coming to Bristol some two and a half years ago that they did not own a single vehicle of their own, and the cost of operating hired transport was .42d. per therm of gas sold, while it is generally admitted that transport costs of an undertaking controlling and owning its own transport are approximately .22d. to 3d. per therm of gas sold. As and when we are able to purchase sufficient vehicles, we hope to save some £10-12,000 per annum on transport alone.

I heartily agree with the author that the initial introduction on the telephone of a consumer to the company can either make or mar an eventual sale, and if it is a maintenance complaint requiring immediate attention, badly handled it must be to the detriment of the undertaking's consumer service. When a consumer has taken the trouble and time to make a request in person, is it sound salesmanship to make him use the telephone in your showrooms? Personal discussion in dealing with a consumer's particular requirements, dealt with in an efficient and businesslike manner, can, and does, produce that understanding which can never be attained by talking through an inanimate instrument like the telephone.

Painting Gangs

With regard to decorative painting, at Bristol each department ran its own particular painting gang; there were between 50 and 60 different varieties of paint in stock, and each individual department deemed it essential to be holding certain paint stocks for their own account. I entirely reorganized this under a foreman painter responsible to head office for the whole of the painting arrangements on all the works and distribution departments, with a mobile team of decorative painters, brush hand, &c., available to go to any of the Company's works or depôts. Internal and external painting are scheduled annually with emphasis on external painting in the summer months and the majority of the internal work being carried out in the winter. Each works is given a schedule of the painting programme in the early part of the year in order to assess and prepare for the interior and exterior painting of plant and structure. This has done away with rush painting programmes being organized by every department individually, and then finding there were not enough painters to go round, with the result that certain vital plant and machinery was missed and carried forward to a later period, with "General Rust" being an easy winner.

In the engineering section of the paper, which deals with segregation of electrical and mechanical repairs, I fully support the idea, but I have possibly gone a little further by putting the electrical plant entirely under an electrical engineer, who controls the whole of the electrical repairs, and a mobile electrical maintenance staff. The electrical engineer prepares his programme at the beginning of each year, which covers scheduled maintenance and ability to cope with electrical failures. This reorganization has been operating for some nine months only and, therefore, it is difficult for me to give an accurate estimate of the savings effected, but I shall be disappointed if the figure is not in the neighbourhood of £4,000 per annum. The strength of this scheme is in its avoidance of electrical breakdowns, ensuring the continuity of production.

I conclude by saying that the author has perhaps introduced the word "functionalism" to cover a number of sound and essential methods of attacking work problems, which many of us call the commonsense approach, without getting involved in trying to mend the shoemaker's last.

Mr. **Kenneth Davis** (Radiation, Ltd.): I am a strong supporter of functional organization and I must confine my comments to a consideration of its limitations, for there is little one can add to the author's use of this system in his own Company. As he rightly says, functional organization is a tool and not an end in itself, and like all tools it is not of universal application. Within any self-contained company or works there may be no limit to the extent to which this system can be used. But where a company consists of a group of works or centres spread up and down the country, then it is that dangers become apparent. It is just because this system can be so useful within any individual works that there is often a temptation to carry it too far.

Scope for Individuality

I trust we may take it as axiomatic to-day that no organization can be successful on a long-term view if its senior officials and executives—indeed, all its members for that matter—are frustrated, discontented, or feel that there is insufficient scope for their initiative. The President, in the conclusion to his address, reminded us of the need for devolution and the placing of maximum authority and responsibility with the individual. If, in a group of companies, such as the one in which I serve, like functions at the various works are to be placed on the shoulders of one official, it automatically entails the setting up of a headquarters staff each member of which will be responsible for one or more function throughout the group. And thus it is that centralization begins to creep in, so often closely followed by bureaucracy and even red tape. For in clarifying the responsibility of the headquarters staff and giving each man there his separate responsibility, it is easy to overlook the effect upon the local officials in charge of the works in other parts of the country. Those at head office, naturally and quite humanly, tend to build up their field of responsibility, whilst local officials become progressively more and more discouraged as responsibility for decision and initiative is taken from them. As this system grows, a further adverse factor is the impossibility of sufficient personal contact between those who take the decisions at headquarters and those who have to carry them out at local centres. I emphasize this question of personal contact as against the written letter or memorandum, because there is probably more harm done to good staff relations by the misundertaking of written notes and letters than by any other single factor.

Thus under a system whereby all major decisions are taken by those in charge of the respective functions at head office it becomes increasingly difficult to get good men of enterprise and initiative to fill the senior positions at the local works. It follows that when local problems arise which still remain to be decided even under a fully functional organization, there is no one capable of giving the right answer nor of inspiring all those under him with a progressive spirit. It is an old and true saying that "the man at the top creates the atmosphere" and within a short space of time there is grave risk of the spirit and morale of the whole unit steadily decreasing. There are, of course, exceptions to these limitations as to everything else in life, but in our own organization each local executive has an extremely large degree of autonomy.

Local Autonomy

On paper it may be thought that a group of works manufacturing similar appliances should standardize on the types of machinery, the stores control systems, the office accounting machines, or even the welfare and canteen arrangements, &c. Each function would, no doubt, be under some super works director, company secretary, or welfare manager, respectively. In practice local autonomy in these matters has been found not only to stimulate initiative, enterprise, and a healthy sense of competition, but has enabled a far greater number of different methods and machines to be investigated. Each of our works uses different methods, has different machines and systems and, indeed, they often differ in character one from the other. This is not to say that there is no link or liaison between them. Such liaison is readily provided by permanent or *ad hoc* committees to ensure that each unit is at least *au fait* with the organization, plant, and ideas in use at all other works within the group.

In view of the grouping of gas undertakings under the approaching nationalization of the gas industry, some consideration should perhaps be given to these possible drawbacks of functional organization. Already some of the troubles on the Coal Board have been publicly admitted as due to over-centralization and, as I stated above, this can so easily result from an attempt to functionalize over too wide an area.

In thus enumerating some limitations of the author's system, let me again say that it has many advantages and applications in individual works or units, provided always that those from whom powers are taken are not left with insufficient responsibility or scope. The guiding principle is that staff and executives should be autonomous and not automatons.

COMPANY MEETINGS

GAS CONSOLIDATION, LTD.

A NOTABLE ACHIEVEMENT

THE fourteenth ordinary general meeting of Gas Consolidation, Ltd., was held on June 29, at 15, Moorgate, London, E.C.2.

Sir LESLIE BOYCE, K.B.E., the Chairman, who presided, said: The accounts for the financial year ended May 31 last show no substantial variation from those of the preceding year. In the balance sheet, investments in subsidiary companies have increased by £10,000, representing the acquisition of additional share capital in a company already within the group. Loans to and from the company have been reduced proportionately.

Turning to the revenue account, it is satisfactory to note that gross receipts are up by £4,000 compared with income received during the previous year. After providing for all expenses, debenture interest and taxation, the sum of £25,079 is available for dividend.

The dividends on the two classes of Preference stock have been paid and the directors recommend that final dividends of 2½% and 3% actual, less tax, be paid on the "A" and "B" Ordinary stock respectively, making with the interim dividends already paid dividends of 5%, less tax, for the year.

The amount to be carried forward will then stand at £30,228, compared with £24,952 a year ago.

The restrictions of the Gas Bill which apply to dividends paid by gas undertakers, also apply to this Company. The rates now recommended by the directors are the highest permitted.

The Gas Bill

As you are aware, the Gas Bill is before Parliament. The Government intend to take not only the gas undertakings of all supply companies, but also all assets of such companies as Gas Consolidation, and compulsory dissolution will take place on or after April 1 next. We are wholeheartedly opposed to the nationalization of the gas industry. It has a fine record of service, efficiency, and labour conditions. All but the smallest gas undertakings already operate under Parliamentary control.

At the present time the most urgent need is for sound planning to make good the arrears arising from the war years and to provide for the rapidly increasing demand for gas. It would be impossible to find a more inopportune time in the history of the nation and of the industry to carry out the experiment of nationalization. We put forward to the Government, in 1946, our considered proposals for a constructive alternative to nationalization, but their economic merits were not sufficiently appreciated. We are, however, doing our utmost to preserve the rights and interests of stockholders, employees and consumers, and we shall continue to do so.

Stockholders of this Company will receive from the Government British Gas stock in satisfaction of the compensation provided for in the Bill. The amount of compensation to be received will be determined by Stock Exchange quotations on certain stated dates. So far as we can ascertain stockholders will be entitled to 22s. 10d. and 22s. 9d. for each £1 unit of "A" and "B" Ordinary stock respectively. The 4% Redeemable Cumulative Preference stock will be valued at par. There are no Stock Exchange quotations for the Company's 4½% Cumulative Preference stock and 3½% debenture stock and, consequently, the "take-over" prices for these investments will be subject to arbitration, unless agreed. This is a matter for a "stockholders' representative" to be appointed by you at a later date.

Unfair Compensation Basis

The Government have as yet to announce the rate of interest the British Gas stock will bear, but without doubt the return will be substantially less than that at present. It is impossible to refrain from protest at the Government's failure to provide fair compensation for gas stockholders. The Stock Exchange quotations are related back to 1945, when all gas stocks had been depressed by war risks, and by Government controls of dividends and prices. The threat of nationalization has prevented their recovery since that year.

A remarkable example of the working of Government controls occurred with one of our subsidiaries. In 1938, rising coal prices had reduced its profit, and the directors agreed to accept reduced fees. In the following year normal fees were restored but, by reason of the temporary reduction, and for no other reason, that company was permanently deprived of all the relief given by a General Gas Order of 1942 to similar companies whose sliding scale dividend restriction had been thrown out of gear by war-time costs.

Gas Consolidation was incorporated in 1934; the principal object of its formation was to put into effect the proposals which originated from leaders of the gas industry some years before. The primary aim was to develop and improve the operation of gas undertakings in the provinces through group workings and integration, with the assistance of a specialized central organization.

Satisfactory Results Achieved

Although this Company has been permitted to operate for only a relatively short period (a large proportion of which included the difficult war years), the results obtained have certainly been satisfactory and give some indication of what might have been achieved had the future been open for further development. The main centre of the Company's activities has been the Midlands—to the north of Birmingham and further to the east. There are also undertakings in the Manchester area.

In all, 18 undertakings have been acquired, three of which have been absorbed by other undertakings in the group. The largest single unit, the Long Eaton Company, has been able to expand rapidly by reason of the fact that a very considerable proportion of its requirements are obtained from the coke ovens at Stanton. During the period from its acquisition in 1936 to 1947 gas sold by this undertaking has been very nearly doubled. An even greater increase in sales has been recorded by the Kidsgrove Company, which has also taken advantage of gas available at nearby coke ovens. That company absorbed two municipal gas undertakings with satisfactory results to all concerned.

Taking the group as a whole, the total quantity of gas sold when the undertakings were acquired was 1,337 mill. cu.ft. By 1944 sales amounted to 2,113 mill., and for the past year they had reached a figure of 2,453 mill. cu.ft. Thus, since joining the group, the supplies given to the public had risen by over 83%. It is noteworthy that, from 1938 to 1946, sales of gas throughout the whole country rose by only 14%.

This phenomenal increase in the consumption of gas developed during a period when the manufacture and distribution of gas was carried out under exceptionally arduous circumstances. There was an acute shortage of labour, and materials needed to carry out ordinary maintenance, let alone extensions to plant, were often unobtainable.

Efficient Management

That this expansion was taken care of without failure was due to the capable management of the undertakings concerned, assisted to a marked degree by the specialized staff of the central organization.

The efficiency of this group of undertakings is demonstrated in other ways. The price of coal purchased for carbonization has risen by 132% since the acquisition of the undertakings; labour and other materials have shown very steep increases. However, despite this abnormal rise in the cost of manufacture, the average receipt per therm of gas sold worked out at only 11.48d., compared with 9.81d. at the beginning of the period—in other words, the consumer had to bear an increase of no more than 17%.

I have already referred to supplies of coke oven gas being obtained by the Long Eaton and Kidsgrove Companies. Although the outbreak of war very seriously curtailed developments which we had intended to carry out, the linking up of certain other undertakings was completed. The Ashton Company's works were closed down, except for the operation of a water gas plant, and a supply in bulk was obtained from the associated Mossley undertaking which possessed one of the most efficient plants in the country. At the present time this plant is being extended to meet the increased demand from the two areas. Elsewhere, the Cheadle and Churnet Valley Companies were amalgamated and the works of the former dismantled.

The Cannock company now supplies Rugeley with peak load gas, thereby avoiding the necessity of increasing the latter's manufacturing plant. In the near future it will be possible to close down the works at Stone as a result of a bulk supply agreement with the gas department of the Stafford Corporation.

Benefits of Group Working

Group working has conferred on the individual undertakings numerous advantages which would have been unobtainable if they had remained outside the general control of the parent company. Such benefits include a central purchasing organization, pensions and life insurance schemes, not to mention the advice and assistance of specialized technical and financial staff from headquarters.

Gas Consolidation has operated throughout in very close association with Severn Valley Gas Corporation which, in turn, manages another large group of gas undertakings. The boards and managements of the two parent companies are almost identical.

In conclusion, I wish to express our very sincere appreciation of the work done by our General Manager, Mr. R. S. Snelling, and the officials, staff and employees of the central organization and group undertakings.

The report and accounts were unanimously adopted.

The meeting terminated with a vote of thanks to the Chairman and Directors.

SEVERN VALLEY GAS CORPORATION

SIR LESLIE BOYCE ON NATIONALIZATION

THE Fourteenth Ordinary General Meeting of the Severn Valley Gas Corporation, Ltd., was held on June 29, at 15, Moorgate, London, E.C.2.

Sir LESLIE BOYCE, K.B.E., the Chairman, who presided, said: The accounts of the Corporation for the year ended Mar. 31 last have been in your hands for some days and, with your permission, I shall take them as read.

The satisfactory profit of the previous financial year has been more than maintained during the period under review. After meeting all expenses and providing for taxation, the revenue profit is £52,321.

The usual preference dividends have already been paid, together with an interim of 2¼% on the ordinary stock. The Directors now recommend a final dividend of 4¼%, less tax, on the ordinary stock, and a dividend for the year of 8½%, less tax, on the deferred stock. Dividend requirements total £47,731, leaving a surplus of £4,590 on the year's working. The rates recommended are the same as last year, and the Bill to nationalize the gas industry prevents any increased rates.

The only item in the balance sheet calling for comment is that relating to taxation, which shows considerable variation from the previous year. The complicated task of finalizing the excess profits tax computations of the Corporation, and those subsidiary companies whose results are consolidated for the purpose of this tax, is nearing completion. It seems likely that there will be no group E.P.T. liability.

This may well be the last occasion on which I shall have the pleasure of addressing you at an annual general meeting. I should, therefore, like to give a brief outline of the short but successful history of Severn Valley Gas Corporation. It was formed in 1934, at a time when a large measure of agreement had been attained, throughout the industry, in favour of a greater degree of integration between gas undertakings, to promote greater efficiency, economy and progress. Those objects we have certainly achieved.

The Group

The whole of the Severn Valley group lies in the general area of the River Severn. It is well laid out for economic administrative control. It comprises 32 gas undertakings, six of which were later absorbed by amalgamation with their neighbours in the group. Others ceased to make gas themselves and bought in bulk from coke ovens or from more economic gas-works. An outstanding example is the Newport Gas Company. In 1935 the annual sales amounted to 310 mill. cu.ft.; two years later we completed arrangements for the supply of gas from nearby coke ovens. As a result, sales for the last financial year reached a total of 1,274 mill.—that is, a fourfold increase. In addition, trunk mains were extended from Newport to two other undertakings in the group, each of which has achieved a similar expansion in business.

A local gas grid in the Gloucester-Cheltenham area has proved its value. Trunk mains now link the undertakings at Cheltenham, Gloucester, Stroud, Tewkesbury, Pershore, Bidford and Campden. They also provide bulk gas to Dursley outside the group. The inadequate works at Bidford and Campden have both been closed and works extensions at Stroud have been made unnecessary. Gas sales in the Campden area have increased more than seventeen times. Other impressive results have been achieved elsewhere.

Despite the interruption of the war, gas corporations as a whole have good reason to be proud of the results achieved. All over the country they have built up groups of gas undertakings and have introduced successful joint working and integration. The response by consumers has been impressive. In 13 years the overall sales have increased by 80%. This compares with approximately 40% increase in the same period in the rest of the country, and with 20% in the next 10 years forecast by the Heyworth Committee's proposals.

Gas Sales Increase

Even among gas corporations the results of the Severn Valley Group are outstanding. Their gas sales have more than doubled in eight years to 1946. The increase for the remainder of the country was some 14%. The average price increased by only 3½%, although the cost of coal in the same period more than doubled.

The capital of all its subsidiaries is substantially less than £500 per mill. cu.ft. sold. This compares with £1,577 per mill. which was the average of the 51 undertakings acquired compulsorily by local authorities at prices fixed by arbitration. This has enabled the dividend and interest component of the price of gas sold by our subsidiaries to be approximately halved.

These results could not have been achieved without skilful technical, financial and administrative control. They are due to the tireless efforts of such eminent gas engineers as Sir George Evetts and Mr. G. M. Gill, backed by the fine executive work of Mr. R. S. Snelling and his able assistants and guided in legal matters by Colonel R. H. Studholme. Above all, we are indebted to our former Chairman, the late Major Julian Day, as the chief architect and driving force of the whole group.

The Bill to nationalize the gas industry, forecast in November, 1945, has now reached the House of Lords after a troubled passage through the Commons. It is likely to become law in a few weeks' time, but it provides that the actual vesting of gas undertakings shall not take place before April 1, 1949. On the vesting date this Company will cease to exist, and it may be that this is our last annual meeting.

The Bill provides for our group of undertakings to be broken up amongst five Area Boards, each operating an extensive area under the general financial control of a Gas Council in London. To us it seems something of a tragedy that the successful structure created by many years of hard work is now to be demolished, to make room for an untried political experiment.

Compensation

The terms of compensation to stockholders cannot be regarded as fair. In the case of quoted securities they are based on Stock Exchange quotations on certain dates in 1945 or 1947. In all other cases they are based on imaginary quotations to be settled by negotiation or by arbitration in the light of the prices of securities which do have quotations.

About 95% of the existing Gas securities were not, in fact, quoted on the relevant dates. Of the comparatively few that were quoted (even in the Official List for the last quotation date) 52 had not been dealt in for more than two months, and 15 for more than a year. One had not been dealt in for nearly seven years! Yet nominal quotations such as these are not only to be the measure of compensation for the securities concerned, but they are also to be the yardstick for assessing the unquoted securities.

Apart from the unreliability of Stock Exchange quotations of gas stocks, the prices in 1945 are clearly unfair. They are now out of date by three years and they were in 1945 still depressed by the war-time vulnerability of gas-works, and by the artificial dividend controls. Those controls cut down the permitted dividend rates, because of war-time costs beyond the control of the companies. In some cases the rates were reduced to nil. In 1942 the Government made an order which gave partial relief to some gas companies, but, by that time, many dividend records had been spoilt, and quotations suffered accordingly.

The 1947 quotations were also unfair because they had been kept down by the Government's declared intention to nationalize the gas industry. They merely reflected the best guess the market could make as to the future compensation terms.

So far as your own holdings are concerned, the compensation values appear to be 21s. 11d. for each £1 unit of 4½% cumulative preference stock and 23s. 8d. for each £1 unit of ordinary stock.

It is sufficient commentary on the absurdity of the so-called "fair compensation" to point out that it results in a valuation only of 23s. 8d. for a gas stock paying 7½%. The company's revenue is derived from 25 prosperous gas companies, many of which have substantial reserves of their own; there is no loan capital; temporary loans are negligible; there is a reserve of £20,000, a carry-forward of over £37,000 and a surplus revenue of more than £4,000 after paying 8½% on £100,000 of deferred stock. These figures speak for themselves.

How Income will be Affected

The loss of real capital value will be heavy, but, if a 3% compensation stock is issued at par, the reduction in income will be 53%.

It is difficult to understand how anyone can honestly claim that such compensation is fair. Yet the Heyworth Committee, the T.U.C. Report and the so-called "Mandate" all stated that fair compensation should be paid.

One feature of the proposed compensation which is particularly unjust to gas corporations, also undermines the Government's own policy of encouraging the ploughing back of profits. If, instead of pursuing a conservative policy, we had extracted more from our subsidiaries, our past dividends would have been larger, and our Stock Exchange quotations higher. The assets taken over on nationalization would, of course, have been of less value, yet we should now be entitled to more compensation.

The Association of Gas Corporations has made strong representations to the Minister of Fuel and Power, and I have myself more than once led representatives of the Association in formal discussions at the Ministry. The main issue of compensation is a matter which the Government were not willing to discuss.

They have, however, now given effect to our contention that gas corporations should be entitled to the same war damage compensation for loss of business as any other stockholders of subsidiary companies.

You will have seen from the Press that the Gas Bill has been ably and stoutly attacked by the Opposition, led by Mr. Brendan Bracken and Colonel Walter Elliot. Our thanks are due to them and to many other Members for their determined efforts to remedy injustices and to improve the Bill.

The industry is particularly indebted to one of your Directors, Colonel R. H. Studholme, who has been acting as the Opposition's adviser and Parliamentary draftsman on both the Electricity Bill and the Gas Bill. In the latter we have inherited the benefit of most of the many amendments made in the Electricity Bill, and some 250 new amendments have now been made in the Gas Bill. Unfortunately, these do not go far to remedy the injustice of the compensation provisions, but further improvements is expected in the House of Lords.

Our best thanks are also due, not only to the General Manager, Mr. R. S. Snelling, and to our Secretary, Mr. C. B. Mawer, but also to all officials, staff and other employees of the central organization and group undertakings for their loyal and energetic service, and we take this opportunity of wishing them the best of good fortune in the future.

The report and accounts were unanimously adopted.

The meeting terminated with a vote of thanks to the Chairman and Directors.

THOMAS DE LA RUE AND CO.

MR. B. C. WESTALL'S SURVEY OF ACTIVITIES

THE Fifty-first Ordinary General Meeting of Thomas De La Rue & Co., Ltd., was held on June 30, at the Dorchester Hotel, Park Lane, London, W.1. Mr. BERNARD CLEMENT WESTALL, C.B.E., Chairman and Managing Director, presided.

The Secretary (Mr. P. M. Studd) having read the notice convening the meeting and the auditors' report,

The Chairman said:—The Directors' report and statement of accounts have been in your hands for some days and with your permission I will take them as read. (Agreed.) As you will have seen from the consolidated profit and loss account, the profit for the year before providing for taxation rose from £477,941 to £528,815. The total dividend on the ordinary stock absorbs £127,325, against £95,425, owing to the increase in the issued capital and, in addition, the dividend on the new preference stock, which did not exist last year, amounted to £9,084. These figures are after the deduction of tax. The total amount provided for taxation is £415,959, against £298,603.

Balance-Sheet Items

Turning to the balance sheet of Thomas De La Rue & Co., the suspense account has been transferred to capital reserve, but, in accordance with the intimation I gave to stockholders last year, a substantial amount £253,285, has been transferred to subsidiary companies, partly to enable them to reduce their items of research and development, and partly to enable them to write down investments in their own subsidiaries. The reserves of the company, including share premium, capital and general reserves, now stand at the substantial figure of £1,813,600. In order, more or less, to offset the debit balances of subsidiary companies carried forward, the general balance carried forward is increased from £134,149 to £313,958. The increase in the bank loan is due partly to the big increase of sundry debtors and partly to advances to subsidiaries.

As you will see from the balance sheet and the consolidated balance sheet, the bulk of the profit derived from the operations of the parent company. The volume of orders in hand is considerable, and unless a major setback takes place in one or more of the countries for which we manufacture monetary documents, your Directors are of the opinion that the results of the current year should prove satisfactory.

De La Rue Stationers

The turnover and profits of De La Rue Stationers were maintained, and the prospects for the current year are equally good. In spite of the manifold difficulties by which manufacturers are surrounded in these days, I think we may fairly claim that our reputation for the quality of our workmanship has been fully maintained.

Plastics Company—Considerable Orders in Hand

Last year I informed you that De La Rue Insulation, Ltd. (your plastics company), would be ready for full-scale production in September. The principal productions of this company are dielectric laminated boards for insulation under the trade name "Delaron" and formica boards for decorative purposes. As far as the removal and installation of the plant was concerned, this promise was fulfilled, but the formal opening of our Tynemouth factory coincided with a period of acute shortage of raw materials. This shortage has now, except for certain specialized materials, been overcome. Furthermore, all the labour at Tynemouth had to be trained for the work, and this took longer than we had anticipated. Due to these factors we were unable to commence the manufacture of formica boards until the end of the year. The various technical difficulties that we encountered have one by one been surmounted and the work now being turned out is of a high standard of quality.

The immediate future of this company now depends to a very considerable extent on the ability of our foreign customers to obtain import licences for the purchase of our material. We have considerable orders in hand which cannot be fulfilled for the time being owing to this situation. Many of our home customers, too, are similarly circumstanced. Indeed, I do not think it too much to say that the success of the European Recovery Plan will depend in no small measure on how far it will enable the countries of Europe to trade freely with each other. At home there is a growing demand for our products, but the maintenance and increase of our sales will depend more on the general economic situation than on the energy of our sales staff.

Gas Development Company

The imposition of the purchase tax in April of last year had a most deleterious effect on the Gas Development Company. We engaged in this enterprise to broaden the basis of the company's activities, and we did so with the full encouragement and support of the Government. The Minister of Supply, on the occasion of the opening of our Gateshead factory, used the following words: "I have already had occasion to congratulate the company for their enterprise and initiative on the score that the existence and operation of this factory will do the company good, it will do the workers and other local inhabitants good, and lastly it will be for the good of the country as a whole because of the water-heaters it will be possible to buy and because of the indirect prosperity which will be induced by the well-being of this part of the country." On the same occasion the Minister also said: "The product which you are immediately producing, the gas water-heater, is intended not merely for the mansions of the rich, but for the homes of even the poorest class of society."

Crushing Purchase Tax

In view of these statements by a responsible Minister of the Crown, nobody, I think, could have foreseen that the Chancellor of the Exchequer would have selected these gas water-heating appliances for the imposition of a purchase tax so crushing as to make it impossible for people of moderate means, let alone the poorest class of society, to purchase an appliance which is the most economic from every point of view for the heating of water. In April last the Chancellor increased this crushing tax to 100 per cent., so that the demand for gas water-heaters completely dried up. Now, two and a half months later, he has reduced the tax to 66⅔. But taxation at this level puts the heater beyond the range of the lower income group which it was designed to serve. As a consequence, we had drastically to reduce our programme and to discharge a large proportion of the staff who had been trained for this particular work. In order to fill the gap the Directors of the Company decided to acquire the patent rights of a gas-operated refrigerator, prototypes for which are now in course of construction. A switch-over of this nature, however, inevitably involved further research expenditure, expenditure which we felt was, in the present circumstances, unwise to charge to capital account. The Directors of your Company are, you may be assured, carefully watching the position and will take every possible step to reduce the loss in the current year.

I am sure that stockholders will have read with regret that Mr. Sidney Lamert has decided not to offer himself for re-election. Mr. Lamert has completed 25 years as a Director of the Company, and he joined the Board in the Company's darkest days. The thanks, I think, of the stockholders are due to him for all he has done for the Company.

On your behalf, also, I should be glad if I might take a message of appreciation of the excellent work done by the staff and workpeople during the past year.

The report and accounts were adopted; the retiring Director, Mr. W. F. Wardley, was re-elected, and the appointment of Lord Killearn to the Board was approved; the auditors, Messrs. Fuller, Wise, Fisher & Co., were reappointed.

The proceedings terminated, after tributes had been paid to Mr. Lamert, with a cordial vote of thanks to the Chairman, Directors, and Staff.

UNITED KINGDOM GAS CORPORATION

COLONEL W. MONCRIEFF CARR'S REVIEW

THE Thirteenth Annual General Meeting of the United Kingdom Gas Corporation was held in London on June 29. Colonel W. MONCRIEFF CARR, O.B.E., T.D., the Chairman, who presided, said: The net revenue for the year, after providing income tax, interest and other expenses, amounted to £165,387, being £5,297 more than the net revenue for the previous year.

The net amount available for distribution is £90,417, out of which we have felt justified in recommending a final dividend of 4% on the Ordinary stock, making 7% for the year, leaving to be carried forward the sum of £54,877.

Achievements

In view of the Bill for the nationalization of the gas industry now before Parliament it may be fitting to give an account of our stewardship during the thirteen years of your Corporation's existence.

In that short period, the Corporation—largest of the gas holding companies—has become the fourth largest gas enterprise in the Kingdom in gas production, second largest in number of consumers served. It controls to-day 76 undertakings, serving a total of 442,165 consumers.

Sales of gas have increased by 110½% since 1936—namely, from 31,243,344 therms to 68,887,900 therms in 1947.

The capital employed by the undertakings per mill. cu.ft. of gas sold, notwithstanding very considerable reconstruction and extension of plant, has been reduced from £815 per mill. cu.ft. sold in 1938 to £469 per mill. cu.ft. sold in 1947, and the incidence of interest and dividend charges has been reduced by more than 40%, falling from 2.689d. per therm sold in 1938 to 1.521d. per therm in 1946.

Finally, in spite of the astronomic rises in the costs of raw coal and all materials, and the increases in salaries and wages which have followed, the average price which our consumers have had to pay for gas has risen from 9.3d. per therm in 1938 to only 11.2d. per therm in 1947.

Coke Ovens Under the Gas Bill

Under nationalization it is proposed to leave coke-oven gas production principally under the administration of the National Coal Board and, in my opinion, this division of coal carbonization operation and development between two separate authorities is certain to lead to unnecessary overlapping of effort, to confusion of aim, and to interminable delays.

The financial policy under which coke-ovens are to be operated must be a matter of great concern to the industrial consumer to whom a cheap and abundant supply is essential, and it is the contention of those concerned in the gas industry that the price the coke-ovens should charge for their bulk gas ought not to be more than the same gas would cost if the ovens were owned, maintained and operated by the gas industry itself.

The achievements I have described in giving an account of our stewardship have resulted largely from plant extensions and reconstructions carried out before and during the war. Since the war we have taken even bigger steps to extend and improve our services to the public, and the Ministry of Fuel and Power has approved schemes for development submitted by us to a total value of over £6 millions, an amount that just falls short of our total outstanding capital.

Compensation

I have commented on one part of the Gas Bill that I consider unsound. I will voice only one other comment. The provisions for compensation are not only unfair but also exceedingly impractical.

Stock Exchange values, the basis of compensation which the Bill provides, are determined by dividend yields, and for many years the dividends of statutory gas companies have been controlled by Parliament. In the vast majority of companies working under basic or sliding scale provision, none of which has been revised since before the war, shareholders have been the losers through the increase in the cost of wages and materials which has increased the price of gas and commensurately diminished dividends.

I fear that the system of compensation outlined in the Bill will mean that the task of settlement will not be completed for years and, because of the many anomalies in dividend yields from company to company, will leave a sense of profound grievance with the many thousands of stockholders concerned.

An amendment to the Bill following the Committee stage provides, for any relevant factors other than the value of comparable quoted securities to be taken into account in the valuation of unquoted securities, and it would appear to be only fair for this provision to be extended to cover quoted securities. In addition, Preference capital and the securities of holding companies are made eligible for war damage claims.

The Future

With regard to the future, I am confident of one thing: the gas industry should exercise an all-important influence in restoring economic health to this great industrial country of ours, if it is permitted to do so.

It is impossible to over-emphasize that the only justification for the existence of the gas industry is an economic justification; it converts coal, our principal source of wealth, into fuels that are approximately twice as efficient as raw coal and it markets these fuels at the lowest possible prices in free competition with electricity, oil and coal itself.

The report and accounts were unanimously adopted.

INSTITUTE OF VITREOUS ENAMELLERS

An interesting programme of technical papers and works visits was arranged for the recent convention of the Institute of Vitreous Enamellers at Bournemouth. In general, the technical theme of the discussions was the preparation of metal surfaces for enamelling, lectures being given by Dr. T. P. Hoar (Department of Metallurgy, Cambridge University), and Mr. H. Silman (Chief Chemist, Joseph Lucas, Ltd.).

Introducing his paper, Dr. Hoar examined the functions of the various degreasing, pickling, and rinsing processes from the point of view of fundamental technical knowledge, but as this paper was planned to be complementary to that presented by Mr. Silman, no description of plant details was given. On the other hand, Mr. Silman dealt exhaustively with degreasing plant of the three general types—vapour, liquor-vapour, and multi-liquor. Discussion of both papers, separately and jointly, was keen and interesting, showing the urgent interest of enamelling technicians in this important subject, and it was felt that the lectures jointly form a notable contribution to the literature.

A novel and most valuable film showing the actual processes of defect formation in the enamel surface during firing was shown by Mr. S. W. Vickery, by permission of the author, Dr. A. I. Andrews. To conclude the meeting, an enjoyable dinner and concert cabaret was held in the Grand Hotel.

An Observant Employee of the Chaseside Engineering Co., Ltd., of Hertford, whose mechanical handling equipment has been exported to no fewer than 26 different overseas countries within the last year, last week noticed and captured a live Colorado beetle lying in the main yard of the works. As this Company does no importing which might have accounted for its presence, the local agricultural authorities are taking energetic steps to discover how this unwanted visitor arrived. They ask that everyone, as well as farmers and agricultural workers, should be on the look out for this insect which, unless checked, can involve the country in financial loss of many millions of pounds.

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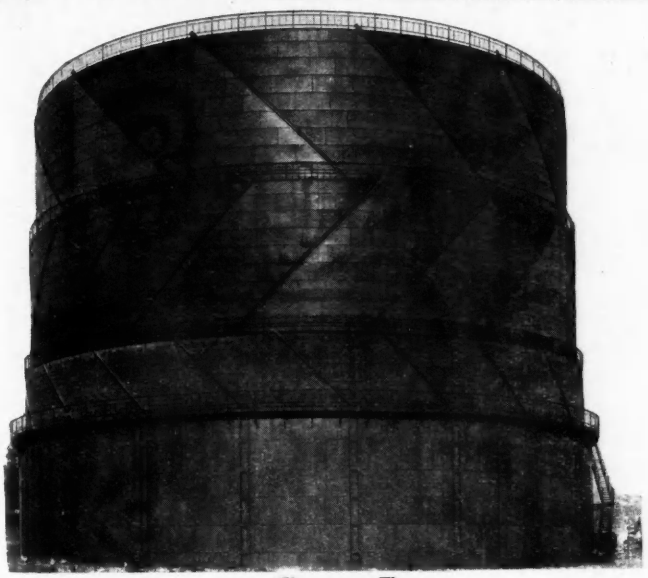

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GAS STOCKS AND SHARES

Last week opened with a considerable number of small sales which caused prices to fall in all sections of the stock market. The number of markings on the Monday was 8,632, an increase of 1,006 over the total for the previous Monday. Sentiment was depressed by the Berlin situation and the continuation of the dock strike, and while the fall in industrials was widespread it was felt least in the iron, coal, steel, and shipping sections. A new account opened more hopefully on Wednesday, following the end of the dock strike and some slight easing of the Berlin tension, and nationalization stocks led a general advance in the gilt-edged market, both transport and electricity stocks showing rises. Mr. Bevin's warning that a grave situation might arise because of the Russian attitude in Berlin gave rise to quiet and generally dull conditions towards the end of the week, and nearly all sections of the industrial market showed declines.

Business in gas stocks was again comparatively quiet, the total number of transactions recorded on the London Stock Exchange for the week being 259, against 240 for the previous week, and 531 for the last week in April.

Home gas securities showed very little price variations. but there were declines in Imperial Continental, Montevideo, and Primitiva Holdings.

The week's price changes were as follows:

OFFICIAL LIST

Alliance and Dublin, Cons. Ord.	21/ — 23/	— 6d.
Assoc. Gas & Water, Deferred ...	22/9 — 23/9	+ 3d.
Croydon, 4 p.c. Perp. Deb. (xd June 30)	94 — 99	— 1
Do. 5 p.c. Perp. Deb. (xd June 30)	118 — 123	— 1
East Surrey, 5 p.c. Irred. Deb. (xd June 30)	117 — 122	— 1
Gas Light & Coke, 3½ p.c. Max. ...	78½ — 81½	+ ½
Imperial Continental	112 — 117	— 3
Montevideo, Ord.	113 — 118	— 4
Newcastle and Gateshead, 3½ p.c. Perp. Deb. (xd June 30)	92 — 97	— 1
Primitiva Holdings, Ord.	11/6 — 13/6	— 1s.
Reading, 4 p.c. Perp. Deb. ...	92 — 97	+ 1
Sheffield, 4 p.c. Red. Deb. (xd June 30)	94 — 99	— 1
South Metropolitan, 3 p.c. Perp. Deb. (xd June 30)	81 — 86	— 1

Quotations on the London Stock Exchange

When last ex-Dividend	Dividends Interest.% Last Yr.	Prev. Yr.	NAME.	Quotations July 1
Feb. 25	4	4	Alliance & Dublin Cons. Ord.	21/ —23/
Apr. 28	5	5	Asscd. Gas & Water U'd'tgs Ord.	22/3—23/3
	6	6	Do. Deferred	22/9—23/9
Mar. 10	4½	4½	Do. 4½ p.c. Red. Cum. Pref.... ...	20/ —21/
"	4	4	Do. 4 p.c. Red. Cum. Pref.	19/ —20/
"	4	4	Do. 4 p.c. Irred. Cum. Pref.... ...	18/ —19/
Feb. 11	7	7	Barnet Ord. 7 p.c. max.	153—158
Feb. 25	5	5	Bath Cons. Ord. 5 p.c. basic	103—108
Sept. 17	6½	10	Bombay, Ltd., Stock	46/- -49/-
Mar. 10	8½	8½	Bournemouth Std. 5 p.c. sliding scale ...	163—168
"	7	7	Do. 7 p.c. max. div.	153—158
"	4	4	Do. 4 p.c. Pref.	96—101
"	6	6	Do. 6 p.c. Pref.	123—128
Feb. 11	3½	3½	Do. 3½ p.c. Red. Deb.	97—102
June 16	4	4	Do. Perp. 4 p.c. Deb.	97—102
Feb. 25	5·35	5·35	Brighton, &c., 5 p.c. Std. Cons.	102—107
"	6·3	6·3	Do. 6 p.c. Std. Cons.	110—115
June 16	5	5	Do. 5 p.c. Perp. Deb.	116—121
Feb. 25	5	5	Bristol, Gen. Cap. 5 p.c. max.	112—117
June 16	4	4	Do. 4 p.c. New Deb. Red.	95—100
Mar. 10	7½	7½	Brit. Gas Light Ord.	127—132
June 16	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113
	4	4	Do. 4 p.c. Red. Deb.	92— 97
Feb. 11	10	10	Cambridge U. & T. Orig. 10 p.c. Cons. ...	190—200
"	5	5	Do. 5 p.c. Cons. 'C'	95—100
"	7	7	Do. 7 p.c. Cons. 'B.'	135—140
Apr. 14	4½	4½	Cape Town, Ltd., 4½ p.c. Cu. Pf.	17/ —19/
Feb. 11	6½	6½	Cardiff Con. Ord.	119—124
Mar. 10	5	5	Cheltenham, 5 p.c. basic Cons. Ord. ...	100—105
June 16	4	4	Do. 4 p.c. Perp. Deb.	92— 97
Feb. 11	5½	5½	Chester United Ord.	106—111
June 2	7	7	Colombo Ltd., Ord.	27/6—32/6
	7	7	Do. 7 p.c. Pref.	22/6—24/6
Mar. 31	5	5	Colonial Gas Assn. Ltd. Ord.	16/ —18/
	8	8	Do. 8 p.c. Pref....	23/6—25/6
Jan. 28	5	5	Commercial Ord.	87— 92
June 2	3	3	Do. 3 p.c. Deb. Perp....	72— 77
Feb. 11	5	5	Do. 5 p.c. Irred. Deb....	107—112
"	6	6	Croydon sliding scale	119—124
"	5	5	Do. max. div.	102—107
"	4	4	Do. 4 p.c. Irred. Pref.	95—100
June 30	4	4	Do. 4 p.c. Perp. Deb....	94— 99xd
"	5	5	Do. 5 p.c. Perp. Deb....	118—123xd
Feb. 11	8	8½	Derby Cons. Ord.	133—138
June 16	4	4	Do. 4 p.c. Red. Deb.	92— 97
Feb. 11	5	5	East Hull Ord.	92— 97
"	5	5	East Surrey 'B,' 5 p.c.	98—103
"	6	6	Do. 6 p.c. Cum. Pref....	117—122
"	5	5	Do. 5 p.c. Irred. Deb.	117—122xd
June 30	5	5	East Wight Cons. Ord.	108—113
Mar. 1	6½	6½	Eastbourne 'A'	97—102
Mar. 10	5	5	Do. 'B'	94— 99
	3½	3½	Gas Consolidation Ord. 'A'	20/6—22/6
June 16	5	5	Do. Ord. 'B'	20/6—22/6
"	5	5	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6
May 19	4	4	Gas Light & Coke Ord.	22/6—23/6
Feb. 11	5	5	Do. 3½ p.c. max.	78½— 81½
"	3½	3½	Do. 4 p.c. Con. Pref.	99—102
"	4	4	Do. 3½ p.c. Red. Pref....	97—100
Dec. 31	3½	3½	Do. 3 p.c. Con. Deb.	86— 89
June 2	3	3	Do. 5 p.c. Deb.	104—107
"	5	5	Do. 4½ p.c. Red. Deb.	104—107
"	4½	4½	Do. 3½ p.c. Red. Deb....	93— 98
Mar. 10	3½	3½	Gloucester Cons. Ord.	94— 99
"	5	5	Great Yarmouth (8½ p.c. max)	13 — 14
Feb. 11	4	2	Guildford Cons. Ord.	132—137
Feb. 25	7½	7½	Hampton C't, 5 p.c. Cons. Ord.	95—100
"	5	5	Hartlepool G. & W. 5 p.c. Ord.	92— 97
"	5	5	Hastings & St. L. (5 p.c. Std.)	97—102
May 19	6	6	Do. (3½ p.c. Std.)	82— 87
"	5	5	Holyhead & N. Wales Ord.	20/ —22/
June 16	7½	7½	Hornsey 3½ p.c. Std.	89— 94
Mar. 10	5	5	Do. 5 p.c. Std	110—115
"	6 7/16	6 7/16	Imperial Continental Cap.	112—117
May 19	8¾	8½	Do. 3½ p.c. Red. Deb....	95—100
Jan. 28	3½	3½	Lea Bridge Co., Cons. Ord....	132—137
Mar. 31	7½	7½	Liverpool 5 p.c. Ord.	120—125
Feb. 11	5½	5½	Luton Cons. Ord. 'A'	148—153
Mar. 10	7½	7½	Do. Ord. 'B'	115—120
"	6½	6½		

When last ex-Dividend	Dividends Interest.% Last Yr.	Pref. Yr.	NAME.	Quotations July 1
Jan. 14	7	7	Malta & Med'n., 7 p.c. 1st Pref.	100—110
	7½	7½	Do. 7½ p.c. 2nd. Pref.... ...	105—115
Feb. " 25	5 5/10	5 5/10	M.S. Utility 'A' Cons.	100—105
"	3 3/10	3 3/10	Do. 'B' Cons.	68— 73
"	5	5	Do. 'C' Cons.	102—107
"	4	4	Do. 4 p.c. Cons. Pref.	95 —100
May 19	2	4	Montevideo, Ltd. Ord.	113—118
Feb. 11	5½	5½	Newcastle and Gateshead Ord.	24/9—25/9
June 30	3½	3½	Do. 3½ p.c. Perp. Deb.	92— 97xd
Mar. 10	7	7	Newport (Mon.) Cons.	95—100
June 16	5	5	Do. 5 p.c. Perp. Deb....	111—116
Mar. 31	6½	6⅞	North Middlesex 6 p.c.	122—127
"	5	5	Do. 5 p.c. Pref.	105—110
Feb. " 11	5	5	Northampton Cons.	103—108
June " 2	9¾	10	Oxford, Cons. Ord.	200—210
	5½	5½	Plymouth & StonehouseOrd.	108—113
"	8½	8½	Do. Addl.	13¼— 14¼
"	7½	7½	Do. New	12⅞— 13⅞
Mar. 10	5	5	Do. 5 p.c. Deb. Perp....	118—123
Feb. 11	7½	7½	Portsmouth & Gosport Cons.	145—150
"	5	5	Do. 5 p.c. max.	101—106
"	10	10	Preston 'A'	177—182
"	7	7	Do. 'B'	125—130
June 24	46	2	Primitiva Holdings, Ltd. Ord.	11/6—13/6
June 16	6	6	Do. 6½ p.c. Red. Cum. Pref.	99—104
Feb. 11	5	5	Reading, 5 p.c. max.	97—102
Feb. 11	—	4	Do. 3½ p.c. Red. (Non-Cum.) Pref....	94— 99
June 16	4	4	Do. 4 p.c. Perp. Deb....	92— 97
Feb. 11	5	5	Romford, Ord.	110—115
Mar. 31	4	4	Do. 4 p.c. Debs. Red....	95—100
June 16	7½	7½	Severn Val. Ltd. Ord.	22/ —23/
Feb. 25	4½	4½	Do. 4½ p.c. Cum. Pref.	20/6—21/6
Feb. 25	6½	6½	Sheffield Cons....	142—147
June 30	4	4	Do. 4 p.c. Red. Deb.	94— 99xd
June 16	—	6	South East'n Gas Ltd. Ord.	21/6—22/6
Mar. 10	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	20/9—21/9
	4	4	Do. 4 p.c. Irred. Cum. Pref.	19/—20/-
Feb. " 11	5	5	South Metropolitan Ord.	96 — 99
	6	6	Do. 6 p.c. Irred. Pref....	123 —128
	4	4	Do. 4 p.c. Irred. Pref.	96 — 99
June " 30	3	3	Do. 3 p.c. Perp. Deb.	81 — 86xd
Jan. 14	5	5	Do. 5 p.c. Red. Deb.	98 —103
Jan. 28	5	5	South Suburban Ord. 5 p.c.	112 —117
"	5	5	Do. 5 p.c. Perp. Pref....	108 —113
"	4	4	Do. 4 p.c. Perp. Pref....	94 — 99
"	3½	3½	Do. 3½ p.c. Red. Pref....	90 — 95
June 16	5	5	Do. 5 p.c. Perp. Deb....	117 —122
Apr. 28	5½	5½	South West. G. & W. Ltd. Ord.	19/—21/-
Feb. 11	5	5	Southampton Ord.	101 —106
Jan. 28	6	6	Sunderland Ord.	113 —118
Feb. 11	4½	4½	Swansea Ord.	82 — 87
"	5½	5½	Do. 5½ p.c. Red. Pref.	100 —105
Mar. " 10	7	7	Swindon Cons. Ord.	114 —119
"	5	5	Tottenham Ord.	115 —120
"	5	5	Do. 5 p.c. Pref.	108 —113
"	5½	5½	Do. 5½ p.c. Irred. Pref.	120 —125
June 2	4	4	Do. 4 p.c. Perp. Deb....	96 —101
May 19	6.85	7½	Tunbridge Wells, 4 p.c. Sliding	122 —127
June 16	—	7	U. Kingdom Ltd. Ord.	22/6—23/6
May 19	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	22/—23/
"	4	4	Do. 4 p.c. 1st Red.Cum.Pref.... ...	19/ —20/
June 16	4½	4½	Do. 4½ p.c. 2nd Non.Cum.Pf.... ...	19/ —20/
Mar. 10	3½	3½	Do. 3½ p.c. Red. Deb....	93 — 98
May 19	6⅜	6⅝	Uxbridge, &c., 5 p.c.Cap.	119 —124
"	5	5	Do. 5 p.c. Pref.	107 —112
June 16	5	5	Do. 5 p.c. Perp. Deb.	116 —121
Feb. 11	5	5	Wandsworth Cons.	117 —122
"	4	4	Do. 4 p.c. Pref....	97 —102
June 16	5	5	Do. 5 p.c. Irred. Deb....	120 —125
"	4	4	Do. 4 p.c. Irred. Deb....	95 —100
Jan. 28	5	5	Watford & St. Albans Ord.	116 —121
"	5	5	Do. 5 p.c. Pref.	106 —111
"	5½	5½	Do. 5½ p.c. Pref.	120 —125
Feb. 11	5	5	Weymouth Ord. (5 p.c. Basic)	92 — 97
"	10¼	11	Woking District "A" Ord....	182 —192
"	7.35	7·7	Do. "B" Ord....	128 —133
"	7½	8	Wolverhampton Cons. Ord.	119 —124
Mar. 31	5	5	York Cons. Ord.	97 —102